A MONOGRAPH OF MECRANIUM (MELASTOMATACEAE: MICONIEAE)

By

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Abstract of Dissertation Presented to the Graduate School of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

A MONOGRAPH OF MECRANIUM (MELASTOMATACEAE: MICONIEAE)

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The genus Mecranium J. D. Hook. comprises 23 species (27 taxa) of montane shrubs and small trees endemic to the Greater Antilles and their satellite islands. Species of Mecranium have axillary inflorescences, 4-merous flowers, and are differentiated from species of the genus Sagraea DC. by an erose or ciliate fringe of hairs located internally at the bases of the stamens, external calyx lobes reduced to minute teeth less than 0.5 mm long at anthesis, and loss of strigose and thick-walled glandular indumentum. Mecranium includes Ekmaniocharis crassinervis Urban and Ossaea acuminata DC. and is composed of two sections. Section Sagraeoides is a basal group comprising M. acuminatum and M. amygdalinum; these species have the synapomorphies of half-inferior ovaries, marsupiform mite domatia, and plicate leaves, with the latter two characters showing homoplasy elsewhere in the genus. Section Mecranium is a derived

group characterized by the synapomorphies of internal calyx lobes fused in a calyptra, which is ruptured by elongation of the style at anthesis, and obovate petals with rounded, retuse apices. Section Mecranium comprises 20 species. One species, M. plicatum Urban, is not known from flowering material and, thus, cannot be placed with certainty in either section.

Mecranium has centers of diversity in the Massif de la Hotte of Haiti (10 spp., 7 endemic), the Massif de la Selle-Sierra de Baoruco of Hispaniola (6 spp., 1 endemic), the Cordillera de Guaniguanico of Cuba (3 spp., 2 endemic), and the Blue Mountains of Jamaica (3 spp., 1 endemic).

Detailed observations of morphology, including scanning electron microscopy (SEM), supplemented by anatomical and cytological observations, are the bases of this treatment, which includes computer-assisted cladistic and phenetic studies: Phylogenetic Analysis Using Parsimony (PAUP) and Principal Components Analysis (PCA), respectively. One previously undescribed species (M. septentrionale), four new combinations at the specific level (M. acuminatum, M. axillare, M. crassifolium, and M. latifolium), two previously undescribed subspecies (M. axillare subsp. proctori and M. integrifolium subsp. alainii), and two new combinations at the subspecific level (M. axillare subsp. urbanianum and M. integrifolium subsp. neibense) are presented.

INTRODUCTION

The genus Mecranium J. D. Hook. (including Ekmaniocharis Urban) is especially interesting because of its unusual geographical distribution and high level of endemism. As treated here Mecranium comprises 23 species (27 taxa) of montane shrubs and small trees endemic to the Greater Antilles (Cuba, Hispaniola, Jamaica, and Puerto Rico), and their satellite islands. Most of these taxa are each restricted to a single mountain range. Little was known about Mecranium before the present work and the majority of described species were known from only a few collections each. The most comprehensive treatment available was a four-page synopsis of seven species by the Belgian botanist Alfred Cogniaux (1891), which was prepared for the de Candolles' Monographiae Phanerogamarum. Between Cogniaux's monograph and the beginning of the present study, 11 species of Mecranium (including E. crassinervis Urban) were described, largely through the collaborative efforts of Cogniaux and Ignatz Urban of Berlin, and the collaboration of Urban with Erik Ekman, the great Swedish botanical explorer of Cuba and Hispaniola. Although no modern comprehensive treatment of the genus was available until now, several regional treatments had been prepared. Among

the most recent were those in the Floras of Cuba (Alain 1957) and Jamaica (Proctor 1972), and in the checklists for Hispaniola (Moscoso 1943) and Puerto Rico (Liogier and Martorell 1982).

In contrast to many other genera in the Miconieae, Mecranium is a genus that is relatively well defined. Mecranium is characterized by the presence of axillary inflorescences, 4-merous flowers, baccate fruits, and three autapomorphies: an "androecial fringe," i.e., a fringe of hairs located internally at the bases of the stamens, reduction of the external calyx lobes to minute teeth less than 0.5 mm long at anthesis, and loss of multicellular strigose and thick-walled glandular hairs. As treated here the genus comprises two distinct sections. The primitive sect. Sagraeoides includes M. acuminatum and M. amygdalinum, both species with free and imbricate internal calyx lobes. Section Mecranium includes 20 species that have the synapomorphies of internal calyx lobes fused in a calyptra, which ruptures irregularly upon elongation of the style before anthesis, and obovate, rounded petals that are notched asymmetrically at their apices. One species, M. plicatum, is not known from flowering material and, thus, cannot be placed with certainty in either section.

Judd (in press) has conducted a cladistic analysis of the axillary-flowered Miconieae in which Mecranium was shown to be the sister genus of Sagraea DC. Judd's delimitation

of Sagraea includes about 60 axillary-flowered species of the genera Clidemia and Ossaea with 4-merous flowers. According to Judd, Mecranium is linked with Sagraea DC. by the synapomorphy of 4-merous flowers. Unlike Mecranium, Sagraea includes both continental and insular representatives. Judd was unable to discover a synapomorphy for the species placed in Sagraea, so this primitive sister genus of Mecranium is metaphyletic, sensu Donoghue (1985), Mishler (1985), and Mishler and Brandon (1987), since its monophyly or paraphyly has not been determined.

For the present study, 18 species of Mecranium have been observed and collected in the field, and over 2000 herbarium specimens have been examined. Field and/or laboratory observations of morphology and ecology, supplemented by anatomical and cytological observations, are the bases of the treatment presented herein. One previously undescribed species (M. septentrionale), four new combinations at the specific level (M. acuminatum, M. axillare, M. crassinervum, and M. latifolium), two previously undescribed subspecies (M. axillare subsp. proctori, and M. integrifolium subsp. alainii), and two new combinations at the subspecific level (M. axillare subsp. urbanianum and M. integrifolium subsp. neibense) are presented. This investigation comes at a crucial moment because the center of diversity for Mecranium is the Massif de la Hotte of Haiti where ten species occur, seven

of them endemic. Human overpopulation and associated deforestation in Haiti threaten several Mecranium species with extinction.

TAXONOMIC HISTORY

The taxonomic history of the genus Mecranium began with the discovery and naming of Melastoma virgata. In his Prodromous, Olof Swartz (1788) described Melastoma virgata and M. purpurascens from Jamaica based on his own collections (see Stearn 1980). The latter was an illegitimate name, having been published previously by Aublet (1775) for a plant from French Guiana now known as Aciotis purpurascens (Aublet) Triana (see Howard 1983). A decade later, Desrousseaux (1797) described two species from "Saint Domingue" (Hispaniola): Melastoma amygdalina and M. multiflora, based on collections made by Joseph Martin, then director of the botanical garden in French Guiana. De Candolle (1828) included the Jamaican and Hispaniolan plants mentioned above in the genus Ossaea DC. (for José Antonio de La Ossa, first director of the botanical garden in Havana) and described a new species of concern here, O. acuminata. De Candolle's Ossaea included nine species characterized by having 3-veined leaves, 4-merous flowers borne in axillary inflorescences, and reduced calyx lobes. These species were also listed as having acute, lanceolate petals, but the petals of these plants actually varied from narrowly triangular with an attenuate apex (e.g., O. acuminata) to

broadly obovate with an emarginate apex (e.g., O. purpurascens). Table 1 summarizes the characters that were used initially to delimit some selected melastome genera of interest to this discussion.

Naudin (1851) recognized seven species of Ossaea, but circumscribed the genus differently from de Candolle. Naudin's concept of Ossaea included only species that are recognized in Mecranium today. All had 4-merous flowers and petals that were broadly obovate with emarginate apices. Five of the Ossaea names used by Naudin are referable to four presently-recognized species of Mecranium. Additionally, he treated O. purpurascens DC., a species with 4-merous flowers and retuse petals, as Miconia ossaeiformis Naudin, probably separating it from the others due to its longer anther sacs. Later Grisebach (1860, 1866) incorporated most of these species in two species of the genus Cremanium D. Don: C. amygdalinum (Desr.) Griseb. and C. virgatum (Desr.) Griseb.

Several years before de Candolle's establishment of the genus Ossaea, David Don (1823) had erected the genus Cremanium D. Don to include species of Melastoma with 4- or 5-merous flowers arranged in terminal or axillary inflorescences, but with these species supposedly uniform in having anthers opening by two pores (Table 1). The name was taken from the Greek word "cremao" (=to suspend) in reference to the pendulous flowers of included species. Grisebach accepted Don's Cremanium, but stated (1860, p.

Table 1. Some characters of selected melastome genera as defined by the original authors.

Genus	*Cremanium* D. Don	*Ossaea* DC.	*Saqraea* DC.	*Mecranium* J. D. Hook.
Year Described	1823	1828	1828	1867
Inflorescence Position	terminal or axillary	axillary	axillary	axillary
Flower Merosity	4 or 5-merous	4-merous	4-merous	4 or 5-merous
Petal Shape	orbicular	lanceolate	oval	obovate
Petal Apex	rounded?	acute	rounded?	obtuse or retuse
Anther Dehiscence	2 apical pores	--	--	1 or 2 gaping pores
Leaf Venation	3 or 5-nerved	3-nerved	3 to 7-nerved	3-nerved
Other	--	--	--	connectives elongate

261) that the genus was "erroneously characterized by the variable number of the pores of the anther," with the species actually best grouped together by their similar prolonged anther connectives.

This idea was presented ten years earlier by Macfadyen (1850) in his treatment of the melastomes of Jamaica. Macfadyen went as far as to say that the name Cremanium was taken from the way the pendant-like anthers were suspended, a statement never made in Don's original description of the genus.

Hooker (1867) also placed importance on this similarity in anther form and erected the genus Mecranium to include relatively glabrous species of Ossaea and Cremanium having leaves with three major longitudinal veins, axillary 4- or 5-merous flowers with rounded petals, and anthers with reduced thecae and elongate connectives (Table 1). The name Mecranium was coined as an anagram of Cremanium. Hooker apparently followed Don and Grisebach, failing to note that these axillary-flowered species were exclusively 4-merous. He estimated that there were seven species of Mecranium, but made no new nomenclatural combinations and designated no type species. It remained for other workers (Wright 1869, Triana 1871) to make the new combinations. Today many of the terminal-flowered species of Cremanium excluded from Mecranium are included within Miconia Ruiz & Pavón sect. Cremanium (D. Don) Naudin.

In the first monographic treatment of Mecranium, Triana (1871) recognized seven species, making five new nomenclatural combinations and listing M. haemanthum, a nomen nudum, which was later published validly by Cogniaux (1891). In the last comprehensive treatment of Mecranium before the present study, Cogniaux (1891) also recognized seven species, including six varieties of M. amygdalinum. He apparently followed Hooker in failing to note that the species were exclusively 4-merous, a fact still overlooked in some recent floristic treatments (e.g., Alain 1957, Barker and Dardeau 1930, Moscoso 1943).

The first three decades of this century were the greatest period of discovery and description of Mecranium species. Cogniaux (1908, 1909, 1913) described two new species and a seventh variety of M. amygdalinum, but most of the new species of Mecranium described during this period were published by Ignatz Urban in collaboration with Erik L. Ekman (Urban 1916, 1921, 1923; Urban and Ekman 1927, 1929). Ekman made collections on which eight new species of Mecranium were based. Six of these, and Ekmaniocharis crassinervis (=Mecranium crassinervum), were the result of Ekman's collecting trips in the Massif de la Hotte of Haiti (see Ekman 1926, 1928).

With the description of new species based on the collections of Ekman and others, Hooker's original generic concept of Mecranium was expanded to include species that were densely pubescent (e.g., M. alpestre), that had leaves

with 5 major longitudinal nerves (e.g., M. puberulum), and that lacked prolonged anther connectives, i.e., with anther sacs occupying essentially the entire length of the anther (e.g., M. haitiense). Remarkably, the presence of a fringe of hairs located internally at the bases of the stamens, and a calyptra formed from fusion of the internal calyx lobes, both important characters in the genus, were not emphasized until the studies of Judd (1986, in press) and Skean & Judd (1986).

The present study recognizes 23 species (27 taxa) of Mecranium, including one new species described here for the first time: M. septentrionale. Ekmaniocharis crassinervis and Ossaea acuminata are also included in Mecranium. Both species share the apomorphies of an androecial fringe, reduced external calyx lobes, and loss of strigose and thick-walled glandular indumentum. Urban (1921) differentiated the monotypic Ekmaniocharis from Mecranium because plants of E. crassinervis have flange-like outgrowths at the nodes. However, this monotypic genus has a calycine calyptra, and on the basis of cladistic studies presented here, is shown to be a relatively primitive member of Mecranium sect. Mecranium. These studies also indicate that Ossaea acuminata is the sister species of M. amygdalinum and a member of Mecranium sect. Sagraeoides.

MATERIALS AND METHODS

General morphology. In the course of this study approximately 1200 specimens were examined from the collections of the following herbaria: A, B, BM, BR, DUKE, E, EHH, F, FLAS, G, GH, GOET, HAJB, IJ, JBSD, JE, K, L, M, MO, NY, P, S, UC, UCWI, and US. Abbreviations follow Holmgren et al. (1981). I made an additional 124 collections (ca 800 specimens), representing 18 species of Mecranium, on Hispaniola and Jamaica between May 1984 and January 1987. More than 2000 sheets were examined in preparing descriptions of taxa. Detailed measurements were made for 2-50 specimens per taxon, depending upon availability of material. Floral measurements were taken either from material preserved in standard formalin-acetic acid-alcohol fixative (FAA), or more commonly, from flowers taken from dried specimens and boiled in 50% ethanol (EtOH) for several minutes. Floral measurements and other detailed observations were made using a Wild M5 stereomicroscope equipped with an ocular micrometer. These measurements and observations provided data for taxon descriptions as well as for phenetic and cladistic analyses, the methodologies of which are detailed under separate chapters.

Vegetative anatomy. Leaf, nodal, and petiolar anatomy were surveyed for all taxa using the simple phloroglucinol-hydrochloric acid technique outlined by Dickison (1974). Most of these observations were made on material preserved in FAA. In cases where liquid-preserved material was not available, organs removed from herbarium sheets were boiled in 50% EtOH prior to study.

Micromorphology (SEM). Pollen, seeds, floral buds, and selected vegetative features were observed using the scanning electron microscope (SEM). Anther sacs of all taxa for which ample pollen was available (all species except M. alpestre, M. obtusifolium, M. plicatum, M. racemosum, M. revolutum, and M. tricostatum) were removed from dried herbarium specimens, attached to stubs with double-sided tape, plated with gold in a Giko IB-2 ion coater for 5 minutes at 8 mA, and examined and photographed at 20 kV using a Hitachi S-450 SEM. Seeds were taken directly from dried berries and prepared in similar fashion, or were taken from FAA-preserved berries or from dried berries that were first boiled in 50% EtOH for several minutes. Liquid-preserved or boiled seeds were dehydrated in a series of successive 15-minute washes in 70%, 90%, and 95% EtOH, followed by two successive 15-minute washes in 100% EtOH. The liquid-preserved or boiled seeds were then critical-point-dried after four 15-minute washes of liquid CO_2 in a Balzers CPD-010 Critical-point Drier. Once dried, these seeds were plated and examined with the SEM like the seeds

taken directly from dried berries. These different treatments (dried, FAA-preserved, EtOH boiling) did not appear to affect the sizes or appearances of the seeds. Floral buds, leaves, stems, and vegetative buds examined under the SEM were uniformly taken from FAA-preserved material that was dehydrated in an EtOH series and critical-point-dried as described above.

Chromosome counts. Chromosome counts were attempted for 13 species using anther preparations of microspore mother cells. Flower buds were preserved in modified Carnoy's Solution (glacial acetic acid: chloroform: absolute EtOH, mixed 1:4:3) and stained in acetocarmine as outlined in Sass (1958).

TAXONOMIC PHILOSOPHY

In this study I have adopted an "evolutionary species concept," like that of Wiley (1978, 1981), and have attempted to define species as the smallest resolved monophyletic units (Mishler 1985). Six species, M. amygdalinum, M. haitiense, M. integrifolium, M. latifolium, M. multiflorum, and M. septentrionale are not defined consistently by apomorphies and may be paraphyletic; hence they are "metaphyletic" species, sensu Donoghue (1985), Mishler (1985), and Mishler and Brandon (1987). The recognition of known paraphyletic and polyphyletic species has been avoided. In practical (=recognition) terms the species found herein are morphological entities that are separated by discontinuities in form, i.e., morphological "gaps." However, gap size has been disregarded in species delimitation because its consideration would necessitate the recognition of paraphyletic species. The species recognized herein are evolutionary lineages with a unique combination of morphological, ecological, and geographical traits. Subspecies are defined more or less in the traditional sense as geographical races that intergrade morphologically (Mayr 1969), in this case on the basis of pubescence or leaf dentition. See Donoghue (1985), Mishler (1985), Mishler and

Brandon (1987), Mishler and Donoghue (1982), and de Queiroz and Donoghue (1988) for detailed discussions of monophyly, paraphyly, polyphyly, as relating to species concepts in plants.

An example of the species philosophy espoused herein is reflected in the treatment of the Mecranium multiflorum complex, a paraphyletic group represented by taxa on all four Greater Antillean islands. The M. multiflorum complex, s.l., includes ten species: M. alpestre, M. axillare, M. integrifolium, M. latifolium, M. multiflorum, M. ovatum, M. revolutum, M. septentrionale, M. tricostatum, and M. virgatum. The members of the group possess bifid anther apices and anthers that dehisce by means of a single gaping 2-chambered foramen with the septum between the anther sacs torn. Half of the species in the complex are quite distinct phenetically, i.e., M. alpestre, M. ovatum, M. revolutum, M. tricostatum, and M. virgatum, while the others are very similar in appearance, being distinguished by rather subtle characters. For purposes of convenience, the latter group, i.e., M. axillare, M. integrifolium, M. latifolium, M. multiflorum, and M. septentrionale, is termed the M. multiflorum complex, s.s.

The M. multiflorum complex, s.s., traditionally has been treated as a single, widespread, polymorphic species, recognized erroneously under the name M. amygdalinum. If the lineages in this complex are "lumped," they would be typified correctly under the name M. multiflorum (see

discussions under M. amygdalinum and M. multiflorum). Such a broadly defined M. multiflorum clearly is paraphyletic (see discussion under Phylogeny). For example, cladistic studies indicate that M. revolutum, a phenetically distinct member of the M. multiflorum complex, s.l., shares a most recent common ancestor with M. multiflorum. Furthermore, a broadly defined M. multiflorum may even be polyphyletic, since M. latifolium, in some of the cladograms (e.g., Figure 11), is more closely linked to the clade containing M. microdictyum and M. birimosum than to other members of the M. multiflorum complex.

It is clear that the recognition of a broadly defined M. multiflorum, representing five separate lineages, would ignore available character distribution data and obscure the pattern of evolution in the group. The five species recognized are allopatric (there is presumably no interspecific gene exchange), can be recognized by subtle morphological characteristics, and are likely monophyletic.

MORPHOLOGY

Habit. Species of Mecranium are evergreen shrubs or small trees to 8 m in height with pleonanthic (indeterminate) shoots. They exhibit Rauh's architectural model; the terminal bud continues apical growth and the inflorescences are axillary and/or cauliflorous (Hallé et al. 1978). Young plants typically have a well developed tap root. In mature plants the bark is usually gray or gray-brown, and is smooth or with very shallow longitudinal furrows. The stems occasionally are swollen at older nodes, a condition most pronounced in M. ovatum.

Wood and nodal anatomy. The structure of the secondary xylem has been described by ter Welle and Koek-Noorman (1981), who studied two species of Mecranium in their survey of the wood anatomy of neotropical Melastomataceae. Wood anatomy was not investigated in the present study. Ter Welle and Koek-Norman examined M. virgatum (Yuncker 18358) and what is probably M. integrifolium subsp. integrifolium (MAD-SJRw 21423, listed as M. amygdalinum from Cuba). In these species growth rings were absent or faint. The pores were largely oval, less commonly round, 28-160 μm in diameter, with walls 2-4 μm thick. They occurred as solitary cells, in short, radial multiples, or in irregular

clusters. Vessel member length ranged from 320-768 ʌm. The vessel perforations were simple. Wood fibers were non-septate, 512-875 ʌm long, 13-18 ʌm in diameter, and had walls 2-3 ʌm thick, which were partly gelatinous. They had simple pits that were concentrated primarily on the radial walls. The rays were heterogeneous and uniseriate, and 15-24 cells high. Tangential, parenchyma-like bands, which contain fibers that differ in structure from cortical fibers, termed "pseudoparenchyma" by ter Welle and Koek-Noorman (1978), were well developed. They existed as short wavy bands and islands comprising largely parenchyma with some fibers. In the present study nodal anatomy was examined for all taxa. The nodes of Mecranium species are uniformly unilacunar with one trace that soon diverges to three or five traces.

Twigs. The young shoots are typically slightly to moderately 4-angled, and range from 1-4 mm in thickness. Young twigs are canaliculate with two longitudinal grooves, (to ca. 0.5 mm wide) on opposite faces of the internode positioned 90° from the attachment of the leaves of the adjacent upper node. Unlike other species in the genus, M. haemanthum and M. tuberculatum have twigs that are strongly 4-angled and longitudinally ridged. In all species, except M. crassinervum, the nodes of young twigs each have a thin ridge 0.2-0.3 mm wide that encircles the node. Such nodal ridges are represented in M. crassinervum by prominent collar-like flanges 1-3 mm wide (Fig. 27B). Most species of

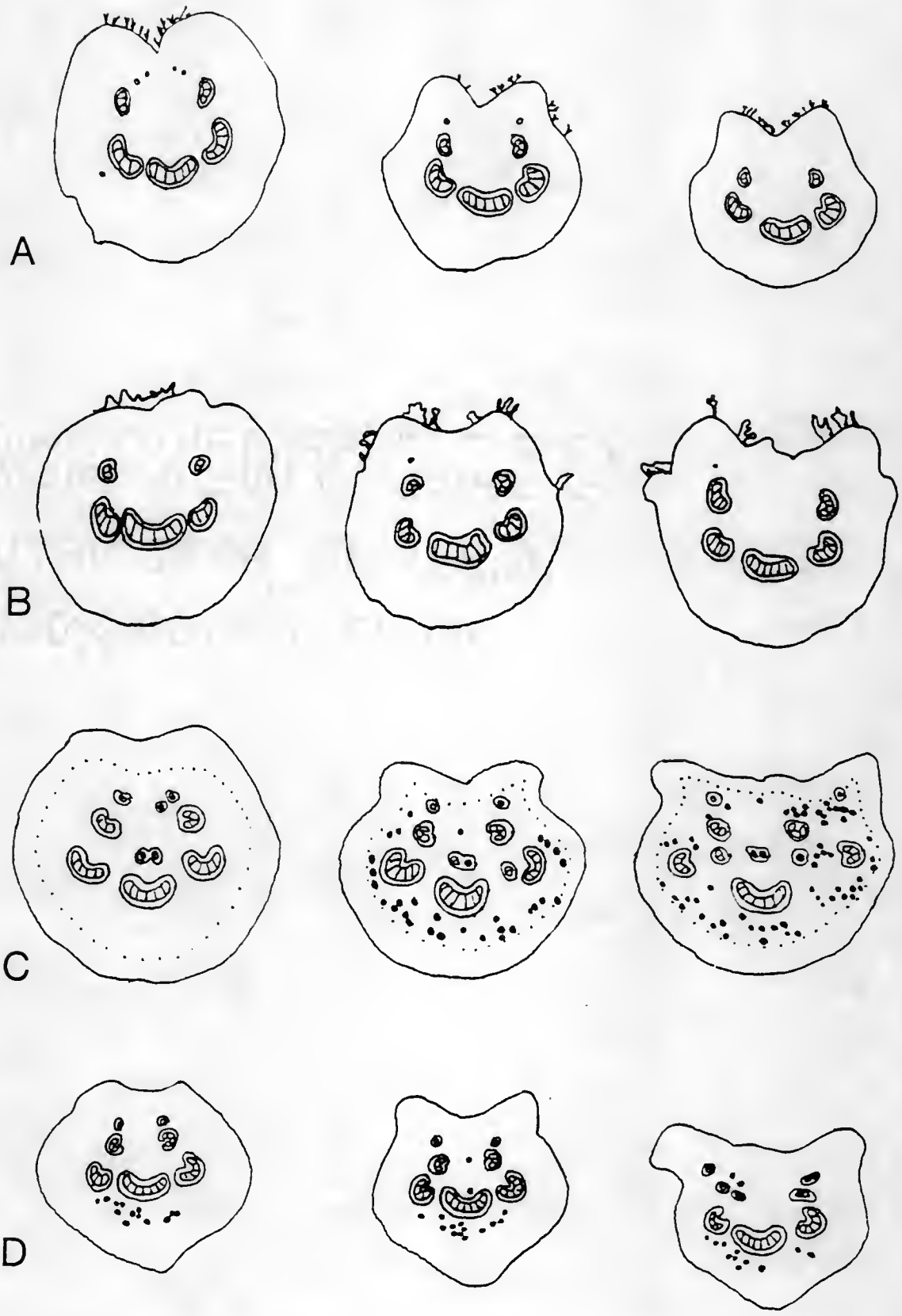
Mecranium have twigs that are essentially smooth or with scattered corky tuberculae. The twigs of M. haemanthum and especially M. tuberculatum are often roughened with prostrate minute multicellular hairs.

Leaves. Species of Mecranium have leaves that are opposite, petiolate, estipulate, and 4-ranked. The petioles are often essentially glabrous, but may be more or less evenly pubescent or with hairs present only on the upper surface, especially on the edges. Laminar venation is acrodromous and suprabasal, or less commonly essentially basal, with a single primary vein (midvein) and two or four longitudinal secondary veins (or with six secondary veins in the sucker shoots of M. alpestre). Tertiary veins are percurrent and more or less perpendicular to the midvein. Quaternary and higher order veinlets are reticulate. (Note: Venation terminology follows Hickey (1973); only the midvein is considered to be a primary vein.) In many species the primary, secondary, and tertiary veins are strongly impressed above, a characteristic often difficult to observe in dried herbarium material. On the abaxial leaf surfaces of dried herbarium material, the smallest veinlets may be flat to slightly impressed, or raised (when viewed under 50x magnification). Stomata are apparently limited to the abaxial leaf surface and are anomocytic. The lamina margin is flat to strongly revolute. In some species it is especially strongly revolute near the leaf base forming basal "pseudodomatia," which were called domatia revoluta by

Stace (1965). Such domatia may harbor mites or small insects (see Fig. 27B, M. tricostatum). The leaf blades of all Mecranium species are obscurely to conspicuously toothed in ca the distal 3/4 of their lengths, except in M. virgatum, which has margins that may be slightly undulate. Marginal teeth often have minute, caducous, acicular projections, which are especially conspicuous in young leaves of M. crassinervum. In some species with revolute leaf margins (e.g., M. birimosum), the margin appears entire because the teeth are obscured by the inrolled leaf edge.

Leaf anatomy. Petiolar and laminar anatomy were surveyed in all taxa and were found to be relatively uniform. Previously, Gottschall (1900) had studied the leaves of M. haemanthum (Eggers 5176) and M. latifolium (Sintenis 1568, 4661, listed as two varieties of M. amygdalinum from Puerto Rico). Semidiagrammatic drawings of petiolar and laminar midvein cross sections of selected Mecranium species are illustrated in Figs. 1 and 2. The petiolar anatomy is relatively complex. Generally five major amphicribral vascular bundles are present; these are formed from fragmentation of the single departing vascular bundle at the node. The three largest of these form an interrupted arc, when viewed in cross section, and the two smaller bundles are located dorsally and slightly laterally with respect to this arc. Occasionally several smaller accessory bundles are located dorsally with respect to

Fig. 1. Semidiagrammatic illustrations of cross sections of petioles of selected Mecranium species. From left to right: petiole base, mid-petiole, and petiole near lamina (ca 60x). A. M. plicatum (Ekman H658, S). B. M. amygdalinum (Skean 2009). C. M. birimosum (Skean 2031). D. M. multiflorum (Skean 1056). Xylem is indicated by hatching. Sclereids are indicated by dark blotches.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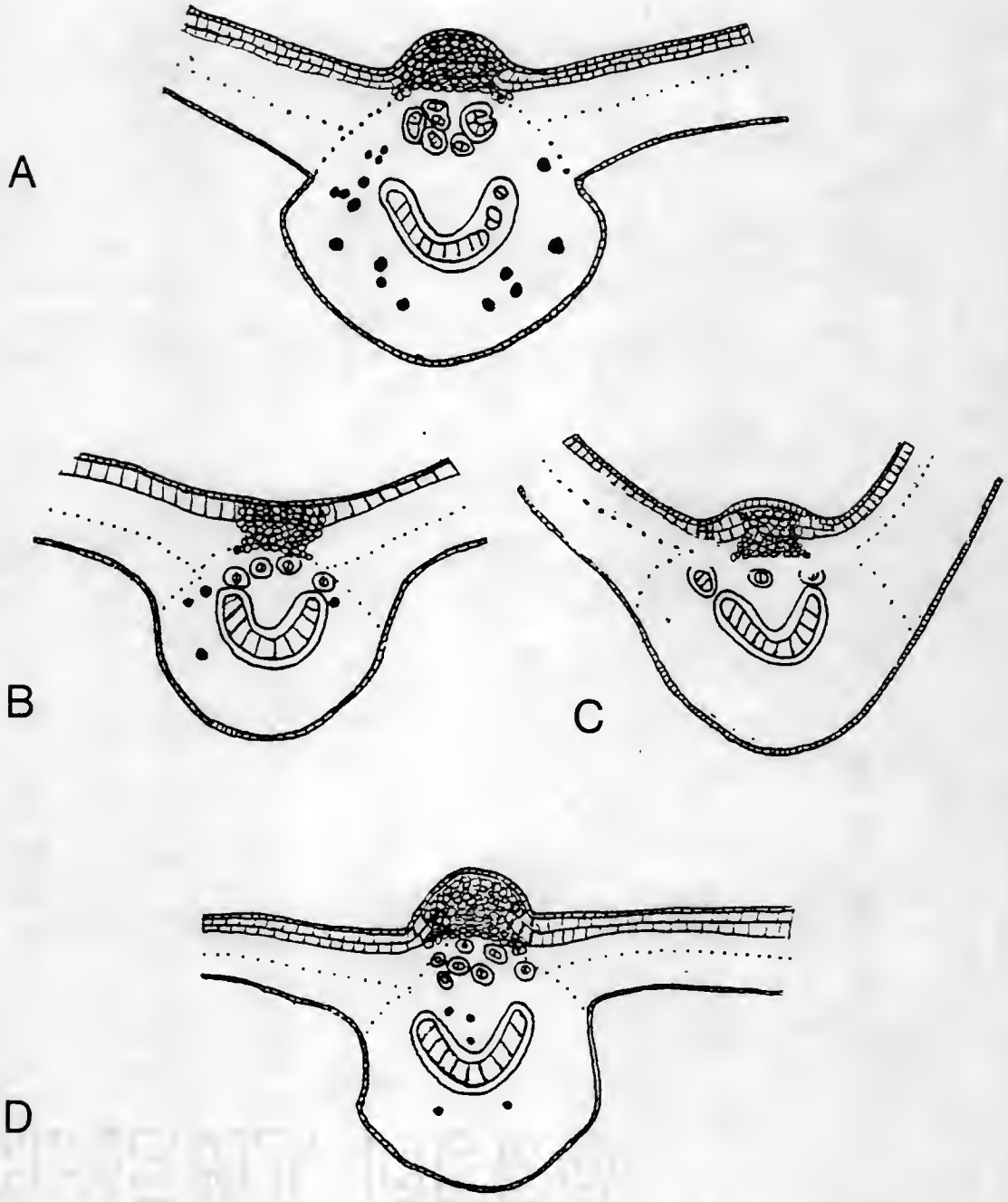
D

Fig. 2. Semidiagrammatic illustrations of cross sections of leaves of selected Mecranium species (ca 60x). A. M. birimosum (Skean 2031). B. M. microdictyum (Skean 1523). C. M. plicatum (Ekman H658, S). D. M. multiflorum (Skean 1056). Xylem is indicated by hatching. Sclereids are indicated by dark blotches. Note upper epidermis and hypodermal layers.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the five major bundles. Scattered lignified idioblasts (sclereids) are common. The parenchyma cells nearest the periphery of the petiole are slightly smaller and in a more compact array than the parenchyma in which the bundles are embedded. In transverse sections taken through the midvein near the middle of the lamina, a large, arcuate, amphicribral bundle is generally present, along with three to many smaller bundles. Sclereids and druses are common in the mesophyll. Cuticle is relatively thin. The leaf epidermis is a single cell layer thick. On the adaxial surface of the lamina the epidermis is subtended by a hypodermis of usually one or two tiers of cells that are larger than the epidermal cells. Palisade mesophyll is usually composed of three or four tiers of cells. Spongy mesophyll is packed relatively loosely. Parenchyma cells of the midvein are smaller and more densely packed toward the periphery of the vein. Occasionally, the parenchymatous tissue of the midvein may be slightly lignified, e.g., in M. crassinervum.

Domatia. Several species of Mecranium possess marsupiform acarodomatia (mite domatia) located on the abaxial leaf surface in the axils of the junction of the primary vein (midvein) and the two largest secondary veins (see Fig. 25C, M. acuminatum). Stace (1965) called this type of structure a domatium marsupiforme. See Wilkinson (1979) for a concise summary of domatial types. Predaceous mites (Cunaxidae) and scavenger mites (Oribatulidae) have

been found in the domatia of M. amygdalinum and M. birimosum, respectively. Unfortunately the fragmented condition of the mite specimens made identification below the family level impossible. Generally the presence or absence of marsupiform mite domatia is characteristic of a given species. Mecranium purpurascens, a Jamaican species, is an exception to this rule; only certain populations on the high ridge of Blue Mountain Peak have domatia. The presence or absence of marsupiform mite domatia has been an overlooked character that can be helpful in identifying morphologically similar species of Mecranium.

Indumentum. Most Mecranium species appear essentially glabrous. Those that are conspicuously pubescent are covered with unbranched to irregularly branched and matted multicellular hairs like those on a leaf vein of M. puberulum illustrated in Fig. 3A. This type of hair usually has a pronounced central axis bearing small, knob-like projections or irregularly placed branches. Wurdack (1986, p. 6) termed these "dendritic hairs with moderately long thin-walled arms." In M. acuminatum, M. amygdalinum, and M. plicatum these hairs are slightly smaller and more regularly branched than in most species of the genus (see the bud hairs of M. acuminatum in Fig. 3C). In M. plicatum the number and placement of the branches may make the hairs appear dendritic-stellate. In other species, such as M. alpestre, the hairs may be clumped together in flattened aggregations that appear scale-like. Aside from variation

Fig. 3. Hair types. A. Irregularly branched multicellular hairs on secondary vein, leaf abaxial surface (M. puberulum, Skean 1832). B. Minute, thin-walled, glandular hair on leaf abaxial surface (M. puberulum, Skean 1832). C. More or less regularly branched hair on inflorescence bud (M. acuminatum, Skean 1757). D. Thick-walled glandular hair from the petal of Sagraea scalpta (DC.) Naudin (Skean 1777); note contrast with B.

A
03307 20KV 50U
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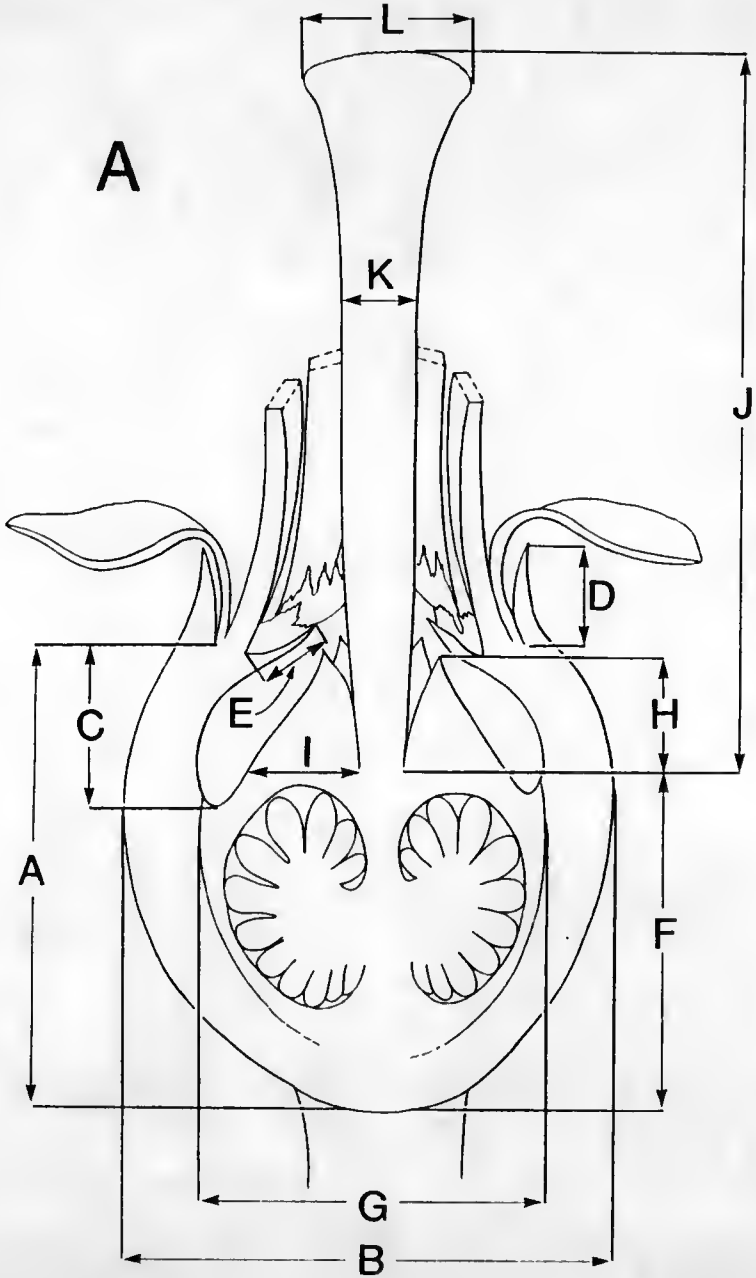
in branching and matting, the placement of these hairs varies on plants of different species. Some species, e.g., M. axillare and M. integrifolium, have stems that are often essentially glabrous. However, high elevation populations of these two species often have hairs lining the internodal grooves of young twigs. In other species, e.g., M. alpestre and M. puberulum, the hairs are more evenly distributed and more or less cover the twigs. In addition to these relatively conspicuous hairs, all Mecranium species have minute thin-walled glandular hairs (see Fig. 3B). Similar hairs are present in all Miconieae; Wurdack (1986, p. 3) termed these, "short stalked glands with thin-walled elongate heads." Thick-walled glandular hairs (see Fig. 3D) are absent from Mecranium, but are often present in the related genus Sagraea.

Inflorescence. The inflorescences of Mecranium species are lateral cymes borne in the leaf axils and/or at former leaf axils of old nodes lacking leaves. The inflorescences of most taxa are borne in the leafy portions of the shoots, but three species, M. haemanthum, M. tuberculatum, and M. virgatum, are exclusively cauliflorous, bearing axillary inflorescences on old wood subtending the leafy portions of the shoots. Mecranium inflorescences may exhibit 1-3 orders of branching and are occasionally branched at the base in robust specimens, giving the appearance of more than one inflorescence per leaf axil or scar. The paired, opposite, triangular bracts of the inflorescence show a reduction in

size from the base of the inflorescence to those immediately subtending the flowers (bracteoles). They are of little taxonomic utility in separating taxa. The two lowest bracts protect the young inflorescence in bud and are caducous, as are several of the larger bracts of the inflorescence. Rarely some of the bracts located proximally on the inflorescence are foliar, resembling small leaves. Weberling (1988) has described the flowering shoots of Mecranium species as monotelic, proliferating inflorescences in which the apex of the inflorescence axis returns to vegetative growth, i.e., the flowering branches (paracladia) of Weberling's "inflorescence" are what I am calling individual inflorescences. Unlike Weberling, some workers have taken a less rigorous approach to the interpretation of "axillary" inflorescences, often confusing deflexed terminal inflorescences with true axillary inflorescences. Judd (1986) has published a preliminary examination of inflorescence position in the Miconieae in which the historical misinterpretation of melastome inflorescence homology is discussed.

Flower structure and terminology. The flowers of Mecranium species are sessile, small, and 4-merous. In most species the petals are less than 2 mm long. Figure 4 is a semidiagrammatic illustration of a floral dissection of M. microdictyum, which serves to illustrate terminology and measurements used in the descriptions and phenetic studies.

Fig. 4. Floral measurements (semidiagrammatic, from M. microdictyum, Skean 1523). A. Flower, longitudinal section. A. Hypanthium length. B. Hypanthium width. C. Length of hypanthium free from ovary. D. Length of non-membranous portion of calyx bearing external calyx teeth. E. Androecial fringe height. F. Ovary length (includes a portion of hypanthium). G. Ovary width. H. Ovary appendage height. B. Proximal stamen segment (filament). M. Filament length. N. Filament width. C. Distal stamen segment (anther). O. Anther length. P. Anther width. Q. Anther sac length. D. Petal. R. Petal length. S. Petal width.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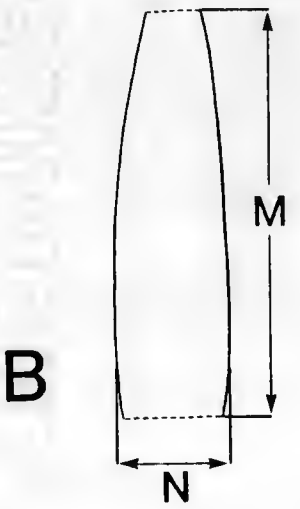
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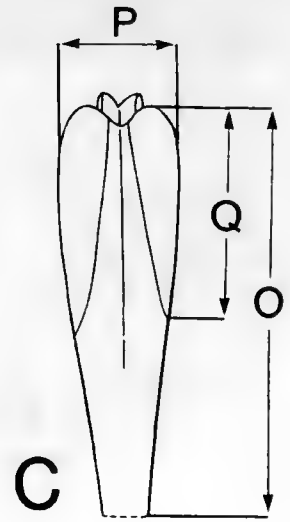
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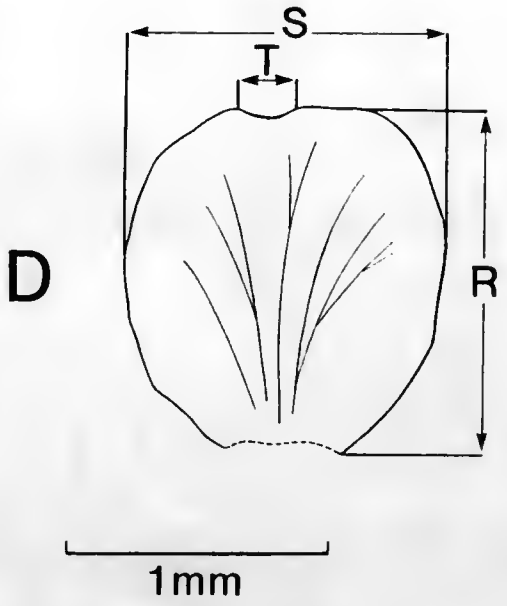
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Hypanthium. The hypanthium is usually subglobose or narrowly obovoid and is rounded at the base. Mecranium virgatum is unique in having an acuminate base that gives the flower a pedicellate appearance. Typically the hypanthium is green, or green and tinged with red-purple if the plant is growing under conditions of high sunlight. Hypanthium length was measured from the base of the flower to the point of stamen attachment (Fig. 4AA). Hypanthium width was measured at the widest point of the structure (Fig. 4AB). The portion of the hypanthium free from the ovary was measured as illustrated in Fig. 4AC.

Calyx. As in most Melastomataceae, the calyx of Mecranium comprises what are termed external and internal calyx lobes (Cogniaux 1891). In Mecranium the external calyx lobes are represented by small, thickened triangular teeth less than 0.5 mm long at anthesis. The internal calyx lobes are free and imbricate (sect. Sagraeoides) or, more commonly, are fused forming an apiculate membranous calyptra (sect. Mecranium). The slightly imbricate internal calyx lobes of a representative of sect. Sagraeoides, M. acuminatum, which are largely hidden by the relatively large external calyx lobes, are illustrated in Figs. 5A-B. Floral bud development in M. multiflorum, a representative of sect. Mecranium, is illustrated in Figs. 6A-C. The membranous calyptra is ruptured irregularly, sometimes leaving 4 lobes opposite the external calyx teeth, as illustrated in Fig.

Fig. 5. Young flower buds of Mecranium and Sagraea species. A-B. Young flower buds of Mecranium acuminatum (Skean 1757). A. Note relatively glabrous buds in dichasium and imbricate internal calyx lobes. B. Note external calyx lobes and emerging petals. C-D. Young flower buds of Sagraea scalpta (Skean 1777). Note robust glandular hairs and acicular petal apices. The latter are absent in Fig. D because they were broken off during SEM preparation.

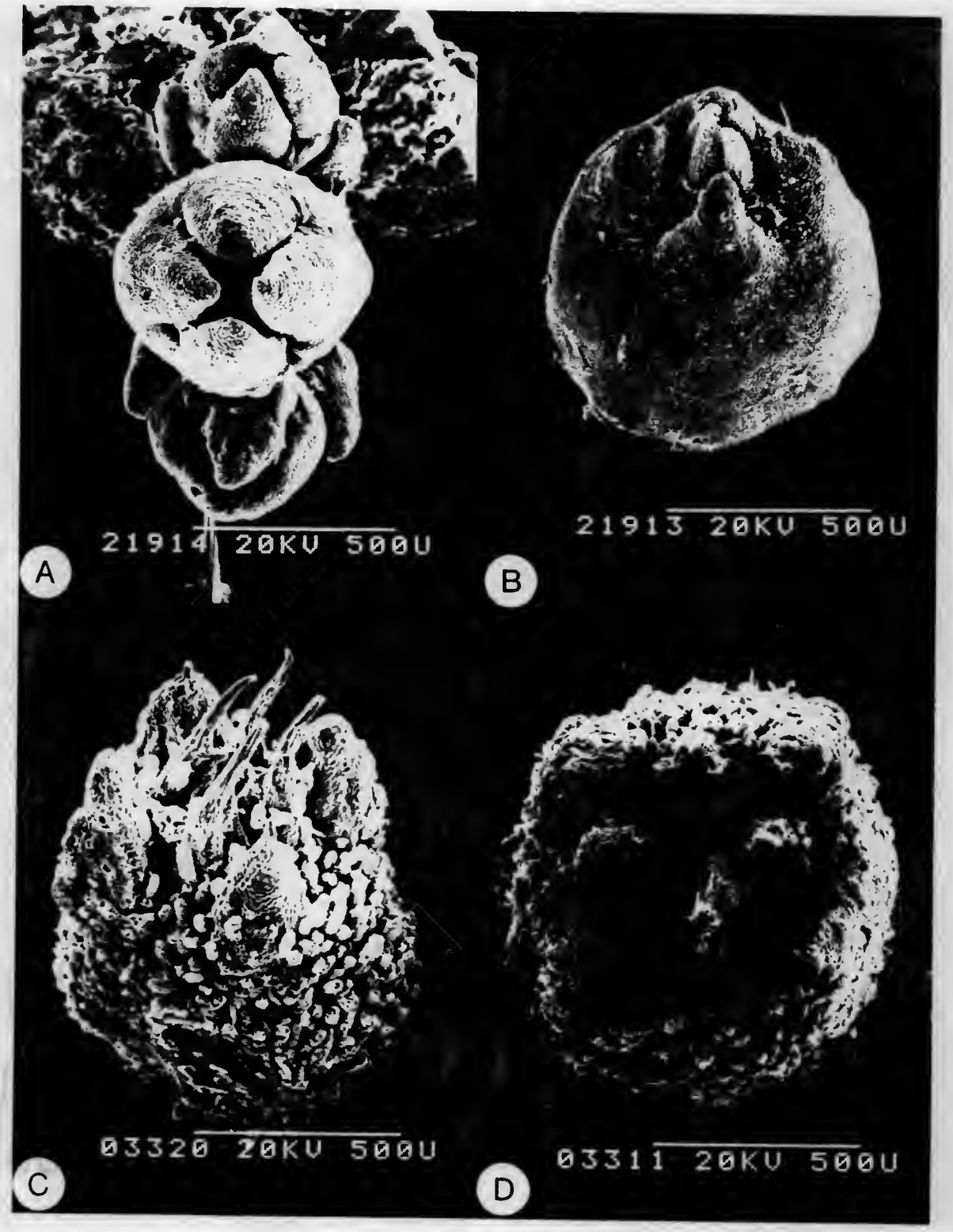
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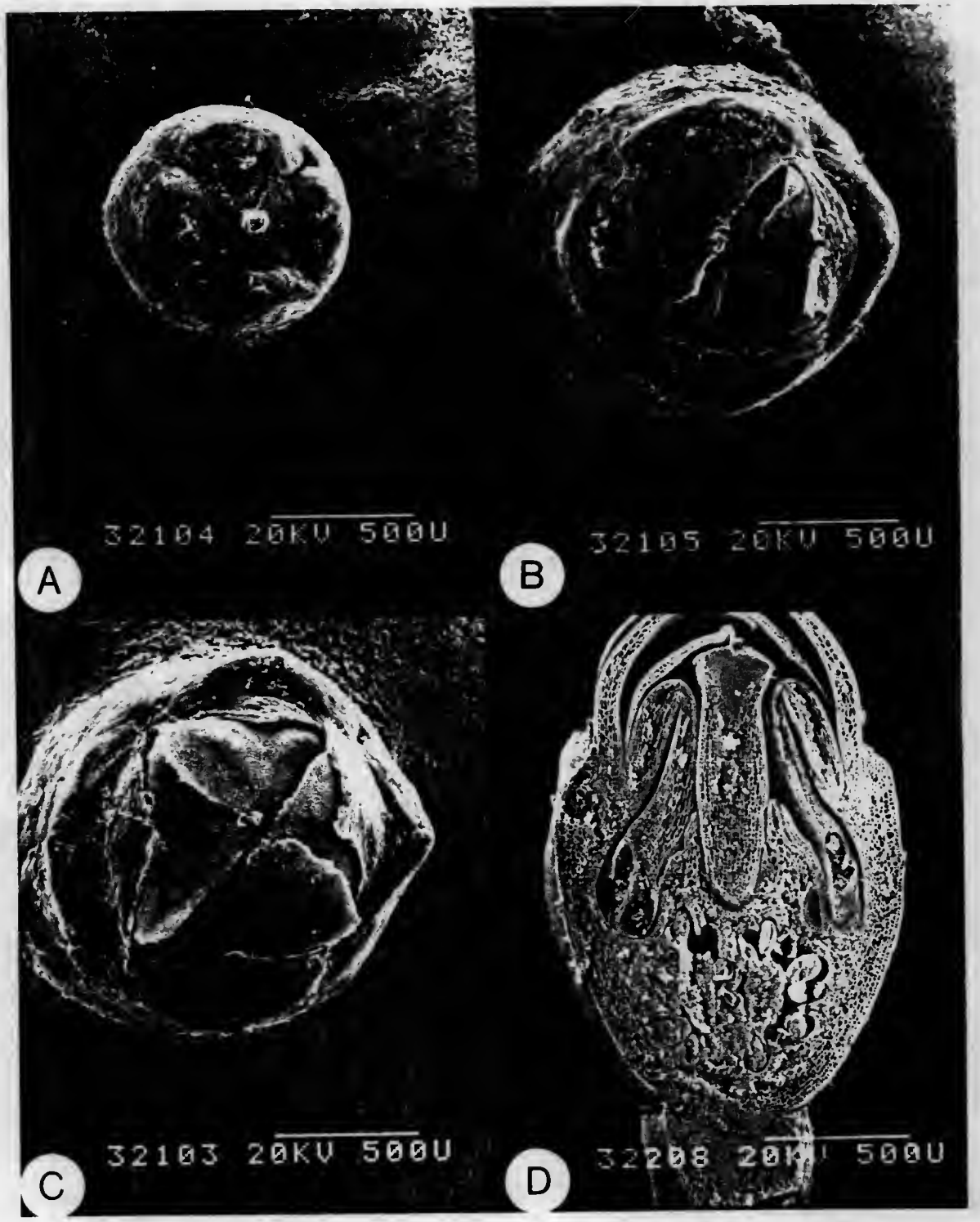
Fig. 6. Floral bud development in M. multiflorum (Skean 1055). A. Young flower bud; note 4 external calyx lobes and centrally located, apiculate calyptra (from fusion of 4 internal calyx lobes). B. Bud illustrating rupture of membranous calyptra; note imbricate petals. C. Bud with ruptured calyptra and exposed, imbricate petals; note external calyx lobes, internal calyx lobes opposite them, and imbricate petals. D. Longitudinal section of flower bud just before anthesis; note folded stamens, style in contact with petals.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6C, or sometimes with the central portion of the calyptra pushed to one side in a nearly circumscissile fashion.

Corolla. The petals of Mecranium species are usually white, but may be tinged basally with yellow or pink. Several species in sect. Mecranium, e.g., M. crassinervum and M. haemanthum, have red-purple petals. In sect. Mecranium the four petals are obovate, with rounded retuse apices. They are imbricate in bud, hooked together by distinct, asymmetrically placed apical notches. In sect. Sagraeoides the petals are ovate or obovate and appearing ovate due to inrolled apices (M. amygdalinum), or narrowly triangular (M. acuminatum), without well defined apical notches, but often possessing hook-like appendages by which the petals are held imbricately in bud.

Androecium. The stamens of Mecranium exhibit many taxonomically useful features. There are eight stamens in each flower. They are isomorphic and inflexed in bud, remaining geniculate at anthesis. The proximal stamen segments (filaments) are flattened and are narrowly ovate or elliptic, less commonly narrowly obovate. When extended at anthesis they are often slightly curved. The distal stamen segments (anthers) may be ovate or obovate. They are relatively straight when extended and are held at angles of 90-130° with respect to the filament when the flowers are fresh, becoming less than 90° as the flowers age. The species of Mecranium with narrowly ovate anthers, here termed "sagraeoid" anthers because they are commonly found

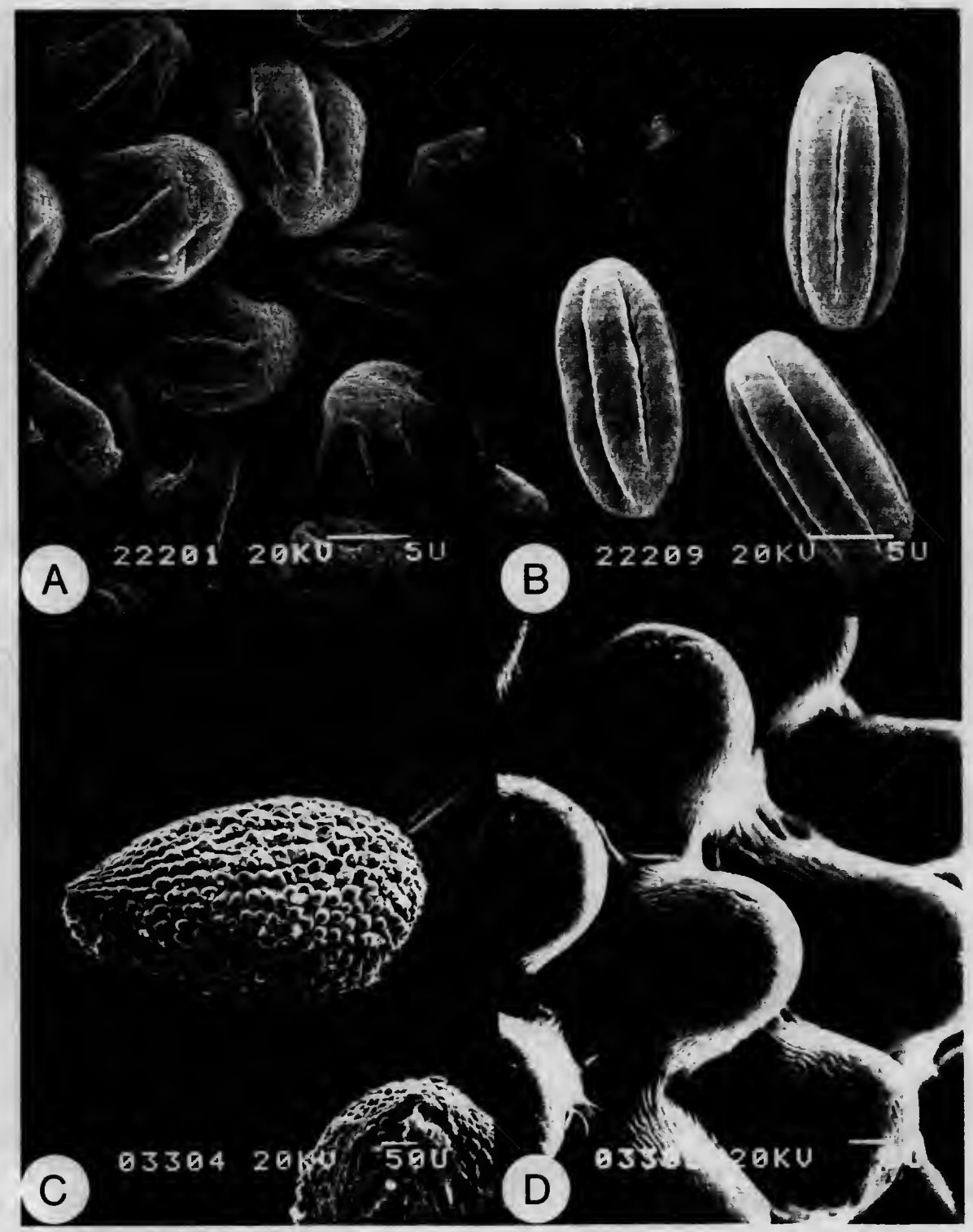
in Sagraea, have anther sacs that occupy nearly the entire length of the anther, and are more or less acute at their apices. The species of Mecranium with obovate anthers, here termed "mecranioid" anthers because they are characteristic of most Mecranium species, have smaller anther sacs, which vary in length from ca 1/2-1/3 of total anther length and are slightly bifid at their apices. Species of Mecranium with sagraeoid anthers shed pollen by means of a single small apical pore, e.g., Fig. 28D, M. haitiense. Species of Mecranium with mecranioid anthers shed pollen in one of two ways (with the exception of M. purpurascens). The anther may dehisce extrorsely or subapically by means of a single gaping 2-chambered foramen with the septum between the anther sacs torn, e.g., Fig. 43E, M. integrifolium, or more or less apically and laterally by means of two pore-like slits which extend across the apex of and down the sides of the anther sacs, e.g., Fig. 47E-G, M. birimosum. In the latter type of mecranioid anther the septum between the anther sacs is well developed and the anther sacs do not shed pollen confluently. In M. purpurascens the anthers are slightly obovate and dehisce by means of a single small apical pore. The anthers of this species resemble sagraeoid anthers with reduced anther sacs. In Mecranium the stamens are subtended by an erose or ciliate fringe of hairs (see Fig 4AE). This "androecial fringe" is localized and comprises the only hairs on the internal surface of the hypanthium.

Pollen. The pollen of Mecranium species is relatively uniform and therefore of little systematic importance in determining relationships among species. The grains are tricolporate with three additional furrows (pseudocolpi) lacking pores. The exine is slightly rugulose. As the pollen matures it becomes elongate. Figures 7A and 7B illustrate the pollen of M. multiflorum and M. axillare subsp. urbanianum respectively. The pollen of M. multiflorum is at a slightly earlier developmental stage than that of M. axillare subsp. urbanianum.

Gynoecium. The gynoecium of Mecranium species is uniformly 4-carpellate with axile placentation. Rarely, some berries are 3-carpellate due to abortion of the ovules in a carpel. In sect. Mecranium the ovule-bearing portion of the ovary is almost entirely fused to the hypanthium and the ovary is 3/4 to fully inferior. In sect. Sagraeoides this fusion is commonly incomplete and the ovaries of these species are 1/2-3/4 inferior. In all species the ovary bears an 8-ribbed apical appendage that encircles the style and encases the folded anthers in bud. The styles of Mecranium species are usually straight, but are commonly deflexed to one side of the flower in sect. Sagraeoides and in some, especially primitive, members of sect. Mecranium. The stigmas are about the same diameter as the styles or may be slightly expanded. The stigmatic surface is papillate.

Fruits. The fruits of Mecranium species are many-seeded globose berries. They are typically urceolate and

Fig. 7. Pollen and seeds of selected Mecranium species. A. Pollen of M. multiflorum (Judd 4783). B. Pollen of M. axillare subsp. urbanianum (Skean 1838). C. Seed of M. latifolium (Sintenis 280, GOET). D. Testa cells (seed papillae) of M. latifolium (Sintenis 280, GOET).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green or tinged heavily with red-purple when immature. At maturity they become deep purple-black and shiny. The berries are essentially glabrous, but may have a sparse covering of minute, thin-walled glandular hairs. The berries of M. puberulum may be very slightly glaucous. Mecranium virgatum is unique in having berries with prolonged narrow bases. The fruits of other species in the genus are rounded at the base. In all Mecranium species the the 4-merous nature of the flower is evident upon examination of the fruit apex, which has a square opening. Within this opening the ribbed apical ovary appendage is visible. In young fruits the androecial fringe may also be present. I have tasted the berries of several species and have found them to be virtually tasteless or slightly sweet.

Seeds. The seeds of Mecranium species are relatively uniform and are of little systematic importance. They are narrowly obovoid and papillose as illustrated in the seed of M. latifolium shown in Fig. 7C. The individual cells of the testa have sinuous margins and each bears a raised papilla, except for testa cells in the hilum region, which are more or less flattened. The cuticle of the testa cells ranges from striate to nearly smooth within each species (Fig. 7D).

Seedlings. Young seedlings were observed for Mecranium acuminatum, M. amygdalinum, M. axillare subsp. proctori, M. axillare subsp. urbanianum, M. ovatum, M. puberulum, and M. septentrionale. Berries were collected in the field, allowed to air dry, and were broken up and placed on moist

vermiculite in the greenhouse ca 3 weeks following collection. Seed germination occurred in 30-60 days. As young seedlings the plants were very uniform in size and shape. The opposite cotyledons were broadly ovoid, 0.7-1 mm long, 0.7-1 mm wide and relatively glabrous. Unfortunately, most of the seedlings died at ca 2 mm height before the prophylls emerged, probably from a fungal pathogen. However prophylls and young leaves were observed for M. amygdalinum. They were narrowly ovate and pubescent with clear, stiff multicellular hairs, to 3 mm long, along the margins and on the upper surfaces of the leaves.

CHROMOSOMES

Little is known about the chromosomes of Mecranium. Buds from M. microdictyum (Skean 1523), preserved in the field at ca 11:00 AM, yielded the only successful count in this study, i.e., n=17. The chromosomes were small and dot-like, ca 2.8 µm long. This base number is quite common in the Miconieae (see Solt and Wurdack 1980). Nevling (1969) reported a chromosome number of n=12 for M. latifolium (listed as M. amygdalinum) taken from flower buds collected in the Sierra de Luquillo of Puerto Rico. No other published reports exist for the genus. Knowledge of chromosome numbers in the genus, especially if they are variable, might provide further insight into evolution in the group.

PHYLOGENY

Cladistic studies were undertaken in an attempt to answer several questions about phylogeny in Mecranium. Specific points addressed were generic circumscription, whether or not there were major clades in the genus warranting formal taxonomic recognition, and the phylogenetic relationships among species. Observations made in data collection revealed that Ossaea acuminata, a species with narrowly triangular petals, and Ekmaniocharis crassinervis, a species with collar-like nodal flanges, both have flowers with androecial fringes like species of Mecranium. Additionally, E. crassinervis, described by Urban (1929) in a monotypic genus closely related to Mecranium and differentiated from the latter by having nodal flanges, has a calycine calyptra like most species of Mecranium. For these reasons both taxa were included in the cladistic analyses of Mecranium species.

Judd (in press) has completed a preliminary cladistic analysis of generic relationships in the axillary-flowered Miconieae. He believes that Mecranium represents a highly derived monophyletic lineage most closely related to the genus Sagraea. As circumscribed by Judd, Sagraea is composed of axillary-flowered species traditionally included

in the genera Clidemia and Ossaea, which share with Mecranium the apomorphy of 4-merous flowers. No apomorphy has yet been discovered for Sagraea, so the genus is considered metaphyletic (see Donoghue 1985, Mishler 1985, Mishler and Brandon 1987). There are approximately 60 species of Sagraea and, unlike Mecranium species, they lack an androecial fringe and a calyptra, they usually have a well developed strigose and thick-walled glandular indumentum, and external calyx lobes greater than 0.5 mm long. Species of Sagraea may have hairs on the torus, i.e., the region of stamen attachment in the hypanthium, but these are part of a more extensive internal hypanthium pubescence, not an eglandular, erose or ciliate, androecial fringe. Sagraea includes both continental and insular species, and is represented in the West Indies by ca 25 species.

Unlike Sagraea, Mecranium appears to be clearly monophyletic and well-defined. Species of Mecranium show three major synapomorphies: (1) an androecial fringe, i.e., an erose or ciliate fringe of hairs located internally at the bases of the stamens, (2) external calyx lobes reduced to small triangular teeth less than 0.5 mm long at anthesis, and (3) loss of strigose and thick-walled glandular indumentum. Most species of Mecranium share an additional apomorphy, that of having internal calyx lobes fused in a calyptra rupturing irregularly upon elongation of the style just before anthesis.

Methods

To investigate the evolutionary relationships of *Mecranium* species, *Ossaea acuminata*, and *Ekmaniocharis crassinervis*, thirty-two vegetative and reproductive characters were carefully chosen and assigned plesiomorphic (ancestral: scored as 0) and apomorphic (derived: scored as 1) states. The data matrix for this cladistic analysis is given in Table 2. Initially ca 40 characters were used, but those showing excessive homoplasy were excluded from the study. With the exception of characters 5, 17, and 28, all characters used were qualitative. The states of these three characters were delimited somewhat arbitrarily following the simple method outlined by Almeida and Bisby (1984). Characters were polarized using the method of out-group analysis, with a generalized *Sagraea* out-group. See Maddison et al. (1984), Stevens (1980), Watrous and Wheeler (1981), and Wiley (1981) for discussions of out-group analysis.

Phylogenetic trees were generated on an IBM-compatible microcomputer with the Phylogenetic Analysis Using Parsimony software package (PAUP version 2.4.1 by David Swofford) using multiple parsimony and global branch-swapping options. This software infers phylogenies under the principle of parsimony (Swofford 1985). A strict consensus tree was generated using CONTREE (version 1/3/86 by D. Swofford). Over 50 PAUP analyses were conducted, each with carefully chosen characters. The single study presented maximizes

Table 2. Character states of species used in the cladistic analysis of Mecranium (0=plesiomorphic state, 1=apomorphic state).

Species	Characters																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
M. ALPESTRE	0	1	1	0	1	0	0	0	0	1	0	1	0	1	0	0	1	1	1	0	1	0	1	0	1	1	1	1	1	0	0	1
M. AMYGDALINUM	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0
M. AXILLARE	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	1	1	0	1	0	1	0	1	1	1	1	1	0	0	1
M. BIRIMOSUM	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0	1	1	1	1	1	0	1	0	1	1	1	1	1	1	0	1
M. HAEMANTHUM	1	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	1	1	0	1	0	0	1	1	1	1	1	1	1	0	1
M. HAITIENSE	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	1	1	1	0	0	0	0	0	0	1
M. INTEGRIFOLIUM	0	1	0	0	0	1	0	0	0	0	0	1	0	1	0	0	1	1	1	0	1	0	1	0	1	1	1	1	1	0	0	1
M. LATIFOLIUM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	1	0	1	1	1	1	1	0	0	1
M. MICRODICTYUM	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	1	0	1	0	1	0	1	1	1	0	1	1	0	1
M. MULTIFLORUM	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	1	1	0	1	0	1	0	1	1	1	0	1	0	0	1
M. OVATUM	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	1	0	1	0	1	0	1	1	1	0	1	0	0	1
M. PUBERULUM	0	1	1	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	1	0	1	0	1	0	1	1	1	1	1	1	0	1
M. PURPURASCENS	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	1	1	0	1	0	1	0	1	1	0	0	0	0	0	1
M. RACEMOSUM	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0
M. REVOLUTUM	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	0	1	1	1	0	1	0	1	0	1	1	1	0	1	0	0	1
M. SEPTENTRIONALE	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	1	0	1	0	1	1	1	1	1	0	0	1
M. TRICOSTATUM	0	1	0	0	1	1	0	0	0	1	0	0	0	1	0	0	1	1	1	0	1	0	1	0	1	1	1	1	1	0	0	1
M. TUBERCULATUM	1	1	0	0	0	1	0	0	1	0	0	0	0	0	1	0	1	1	1	0	1	0	0	1	1	1	1	1	1	1	0	1
M. VIRGATUM	0	1	0	0	0	0	1	0	0	1	1	0	0	0	1	1	1	1	1	0	1	0	0	0	1	1	1	0	1	0	0	0
E. CRASSINERVIS	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	1	1	0	0	0	0	0	0	0
O. ACUMINATA	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0	0	1	0	0	0	0	0	1	0

phylogenetically useful characters and careful polarity decisions.

The cladograms were rooted using a hypothetical ancestor having all characters scored as plesiomorphic. Two species, M. obtusifolium and M. plicatum, were excluded from the study because their floral structures are not entirely known. Autapomorphies of five species (characters 4, 8, 16, 20, and 22) were excluded from the computer analyses, but were added manually to the cladograms. They were not included in calculations of the consistency index.

Characters

The synapomorphies used in the cladistic analysis and autapomorphic features are listed numerically and discussed briefly below.

1. Twig shape in cross section. Nearly all species in the out-group, Sagraea, have twigs that are slightly to moderately 4-angled. Two species of Mecranium, M. haemanthum and M. tuberculatum, have twigs that are sharply 4-angled and ridged. This character is considered apomorphic in Mecranium and is of occasional occurrence elsewhere in the Miconieae [e.g., Miconia jimenezii W. Judd & R. Beaman and M. quadrangularis (Sw.) Naudin].

2. Loss of strigose indumentum. In Sagraea most species have an indumentum of relatively stout, multicellular hairs; those on the leaves are often swollen at the base. Species of Mecranium have an indumentum of

more delicate multicellular hairs that are unbranched to irregularly branched and matted. Wurdack (1986) called the most branched of these "dendritic hairs with moderately long, thin-walled arms." This hair type is also found in some species of Sagraea in addition to the stout hairs. Minute short-stalked multicellular glands with elongate, thin-walled heads are present in both Mecranium and Sagraea, but most Sagraea species have minute multicellular glands with thick-walled heads, which are lacking in Mecranium.

3. Twig vestiture. Most species of Mecranium are essentially glabrous or have populations growing at upper elevations with unbranched to irregularly branched and matted multicellular hairs lining the grooves on the internodes of young twigs. Three species, M. alpestre, M. puberulum, and M. racemosum, have a more or less uniform covering of these hairs on the twigs, which is considered apomorphic for the genus. The loss of well-developed vestiture is a synapomorphy for species of Mecranium (see earlier discussion), and therefore this reversal is considered apomorphic.

4. Nodal flanges. Collar-like flanges at the nodes are an autapomorphy for Ekmaniocharis crassinervis. Such flanges are not known in Sagraea or in species of Mecranium. These nodal outgrowths are rare in the Miconieae. Similar structures occur in Miconia condylata Wurdack.

5. Leaf size. Most species of Sagraea and Mecranium have leaves of reproductive shoots greater than 3 cm long.

Two species of Mecranium, M. alpestre and M. tricostatum, have leaves that are usually less than 3 cm long. The small leaves of these two high-elevation species are considered apomorphic. See Fig. 8 for the justification of the division of this feature into two states.

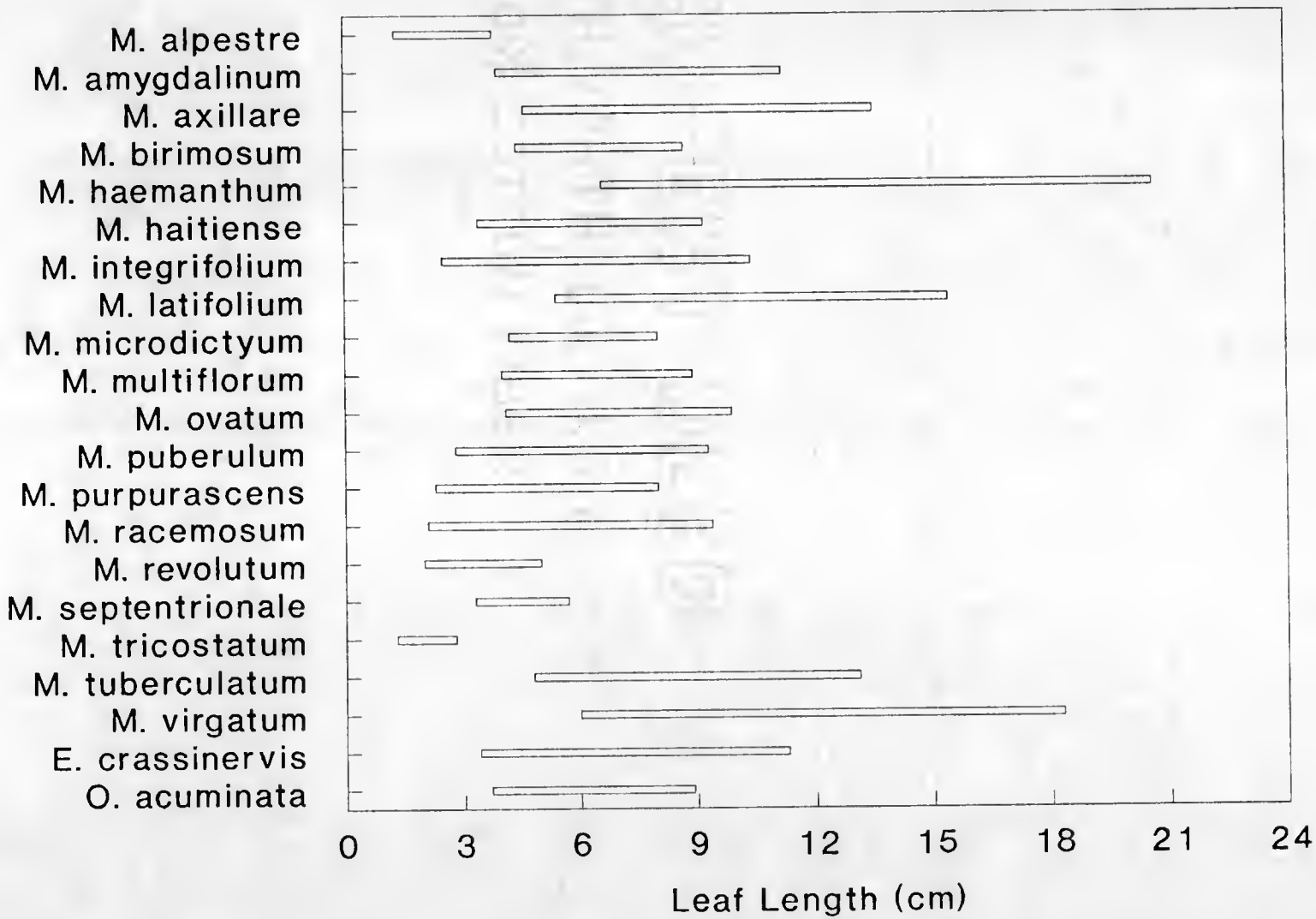
6. Leaf shape. Most species of Sagraea have leaves that range from ovate to elliptic. The common occurrence of elliptic to obovate leaves in some Mecranium species is considered apomorphic. There are problems in the determination of polarity in this character, because it is polymorphic in the out-group. However, the uncommon occurrence of obovate leaves in Sagraea suggests that this character is apomorphic in Mecranium (see Frolich 1987).

7. Leaf folding. Most species of Sagraea and Mecranium have leaves that are more or less plane or are slightly curved abaxially. Some species of both genera have leaves that are strongly plicate, especially when the plants are growing under conditions of high sunlight. Plicate leaves are considered apomorphic for Mecranium.

8. Leaf inrolling. Leaves that are strongly inrolled abaxially are an autapomorphy of M. revolutum. This condition is uncommon in Sagraea, and can be considered apomorphic in Mecranium (see Frolich 1987).

9. Number of conspicuous longitudinal veins. Most species of Sagraea have leaves with three conspicuous longitudinal veins (midvein and two secondary veins). The

Fig. 8. Leaf length (cm) for species in the cladistic study.


M. alpestre
M. amygdalinum
M. axillare
M. birimosum
M. haemanthum
M. haitiense
M. integrifolium
M. latifolium
M. microdictyum
M. multiflorum
M. ovatum
M. puberulum
M. purpurascens
M. racemosum
M. revolutum
M. septentrionale
M. tricostatum
M. tuberculatum
M. virgatum
E. crassinervis
O. acuminata
0
3
6
9
12
15
18
21
24
Leaf Length (cm)

condition of five conspicuous longitudinal veins is considered apomorphic in Mecranium (see Frolich 1987).

10. Smallest veinlets of leaf abaxial surface. In most species of Sagraea the smallest veinlets on the leaf abaxial surface, when viewed under 50x magnification, are flat in dried material. The presence of raised veinlets is considered apomorphic in Mecranium (see Frolich 1987).

11. Indumentum of vein axils on abaxial leaf surface. In most species of Sagraea the axils at the intersection of the midvein and two largest secondary veins bear multicellular hairs, which may or may not be shed as the leaf matures. The absence of such hairs in M. ovatum and M. virgatum is considered apomorphic (see Frolich 1987).

12. Persistence of hairs in vein axils on leaf abaxial surface. In most species of Mecranium, unbranched to irregularly branched and matted multicellular hairs are caducous. However, in several species they persist in tufts at the axils of the junction of the midvein and two largest secondary veins. Persistent strigose hairs are common in Sagraea, but the loss of such pubescence is here considered a synapomorphy defining Mecranium. Thus, the reversal to the pubescent condition is considered apomorphic (see character 3).

13. Marsupiform mite domatia (acarodomatia). Marsupiform mite domatia are present in the two major vein axils in several species of Mecranium. These are usually

absent in species of Sagraea and are thus considered apomorphic in Mecranium (see Frolich 1987).

14. Leaf basal pseudodomatia. In most species of Sagraea and Mecranium the margin of the leaf base is more or less plane or slightly revolute. In several species of Mecranium, however, the revolute leaf base forms basal "pseudodomatia," which often harbor mites or small insects. The presence of pseudodomatia is considered apomorphic in Mecranium.

15. Cauliflory. Most Sagraea and Mecranium species have inflorescences that are borne in the leaf axils and on nodes that have recently lost leaves. Three species (M. haemanthum, M. tuberculatum, and M. virgatum) are cauliflorous, i.e., the inflorescences of these species are borne more or less exclusively below the leafy portion of the shoot, in former leaf axils on the old wood. Cauliflory is considered apomorphic in Mecranium.

16. Prolonged hypanthium base. A prolonged hypanthium base, giving the flower a pedicellate appearance, is an autapomorphy for M. virgatum. The great majority of Sagraea species and all other species of Mecranium have a rounded or obtuse hypanthial base (see Frolich 1987).

17. Reduced external calyx lobes. In all species included in this study the external calyx lobes are reduced to small teeth less than 0.5 mm long, an apomorphy. The majority of species in Sagraea have external calyx lobes that are several millimeters or more in length.

18. Calyptra. The presence of a calyptra formed from fusion of the membranous internal calyx lobes is a synapomorphy for all but two species included in the study, which have free and imbricate internal calyx lobes. No calyptrate species is known in Sagraea, and this character is considered apomorphic in Mecranium. In the Miconieae calyptrae occur in both both axillary-flowered genera (e.g., Loreya DC.) and terminal-flowered genera (e.g., Conostegia D. Don and Miconia Ruiz & Pavón).

19. Calyptra shape. In the calyptrate species included in this study, this structure is commonly dome-like and apiculate. Mecranium racemosum is unique among these taxa in having a conical calyptra. Determining the polarity of this character is difficult. Mecranium racemosum also exhibits the characteristics of relatively large calyx teeth, reflexed petals, and a deflexed style, not unlike some species of Sagraea. Therefore this conical calyptra was considered plesiomorphic, and the dome-like, apiculate calyptra apomorphic within the taxa studied.

20. Internal calyx projections. The flowers of M. birimosum are unique among Mecranium species in having an additional whorl of four flattened, narrowly triangular calyx projections on the inside of the calyx tube opposite the external calyx teeth. Such structures are apparently lacking in species of Sagraea. Internal calyx projections are considered an autapomorphy of M. birimosum.

21. Petal shape. Most species of Mecranium have obovate petals that are asymmetrically notched on their rounded apices. Ovate or narrowly triangular petals are characteristic of Sagraea; thus, obovate, retuse petals are considered apomorphic in Mecranium.

22. Petal venation. Petals with a single longitudinal vein appear to be derived, because most species of Sagraea have multi-veined petals (see Frolich 1987). Ossaea acuminata has 1-veined, narrowly triangular petals, which are considered an autapomorphy of this species.

23. Petal posture. Strongly reflexed petals are very common in Sagraea. The spreading petals of most Mecranium species are considered apomorphic.

24. Petal color. White or cream petals are most common in Sagraea. Therefore red-purple petals are considered apomorphic in Mecranium.

25. Androecial fringe. A fringe of hairs or scale-like, erose structures, located internally at the bases of the stamens, is apparently lacking in Sagraea. This structure is present in all species of Mecranium

26. Anther shape. The distal stamen segments (anthers) of species of Sagraea are narrowly ovate or narrowly elliptic. Thus, obovate anthers are considered apomorphic in Mecranium.

27. Anther apex. In Sagraea the anther apex is typically acute or obtuse. Thus, the bifid apex is considered apomorphic in Mecranium.

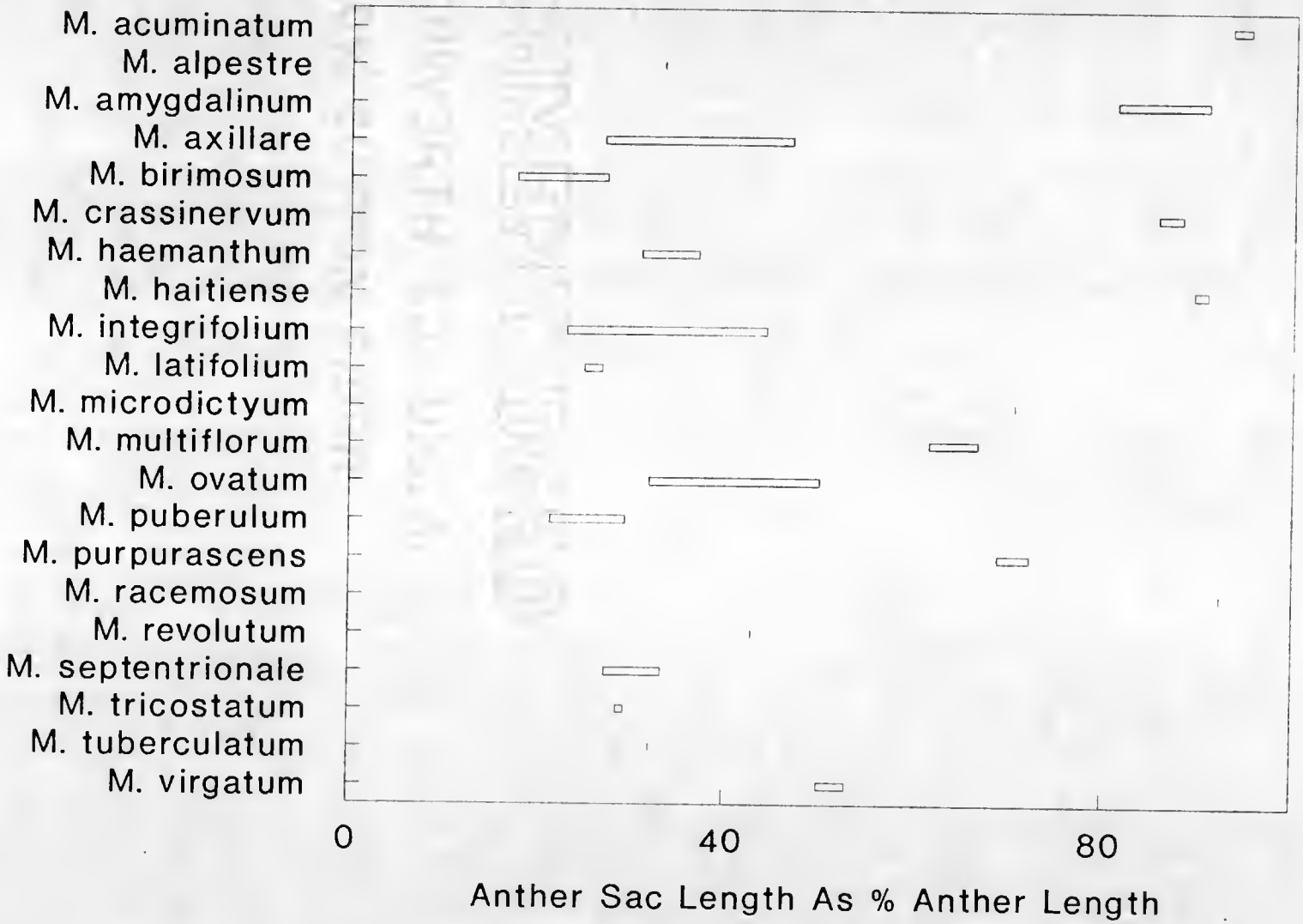
28. Anther sac length. A reduction in anther sac length is considered apomorphic in Mecranium because the stamens of Sagraea have anther sacs occupying nearly the entire length of the anther. Anther sac lengths of less than 40% of total distal stamen segment (anther) length were considered apomorphic. Figure 9 illustrates the somewhat arbitrary delimitation of these size classes.

29. Anther dehiscence. The ovate anthers of Sagraea dehisce by means of a single small apical pore. This condition is considered plesiomorphic in Mecranium. Anthers that open by a single gaping apical foramen or two small slits were considered apomorphic.

30. Anther septum. In Sagraea both anther sacs dehisce confluently through a single small apical pore located centrally between them. In most species of Mecranium the anthers open by means of a gaping, 2-chambered foramen with the septum torn, i.e., with the anther sacs somewhat confluent also. In some species of Mecranium the anther sacs are separated by a persistent septum, with the anthers opening by means of two pore-like slits. This condition is considered apomorphic in Mecranium. Characters 29 and 30 actually form a transformation series with stamens opening by a single small apical pore the most primitive, and anthers opening by two pore-like slits, with a persistent septum, the most advanced.

31. Ovary position. In most species of Sagraea the ovary is inferior, i.e., with most of the ovule-bearing

Fig. 9. Anther sac length as a percentage of total anther length for species in the cladistic study.


M. acuminatum
M. alpestre
M. amygdalinum
M. axillare
M. birimosum
M. crassinervum
M. haemanthum
M. haitiense
M. integrifolium
M. latifolium
M. microdictyum
M. multiflorum
M. ovatum
M. puberulum
M. purpurascens
M. racemosum
M. revolutum
M. septentrionale
M. tricostatum
M. tuberculatum
M. virgatum
0
40
80
Anther Sac Length As % Anther Length

portion fused with the androperianth tube. The common occurrence of nearly half-inferior ovaries in Mecranium amygdalinum and Ossaea acuminata is considered apomorphic.

32. Style curvature. The styles of many Sagraea species are deflexed to one side of the flower at anthesis, not just as the flower begins to wither. Thus, relatively straight styles are considered apomorphic in Mecranium.

Results and Discussion

The PAUP analysis of these morphological features yielded twenty-six equally parsimonious 51-step trees, each with a consistency index of 0.529. Figure 10 illustrates a representative tree. It is 56 steps in length because five autapomorphies were added manually. The strict consensus tree is illustrated in Figure 11. Ekmaniocharis crassinervis and Ossaea acuminata are nested within the trees, and are hereafter referred to as Mecranium crassinervum and M. acuminatum, respectively.

A comparison of the representative cladogram in Fig. 10 with the strict consensus tree (Fig. 11) indicates that the topologies of the 26 trees are relatively stable. The unresolved lineages are illustrated in the septachotomy in the consensus tree.

On the basis of the study presented here, Mecranium may be treated as comprising two monophyletic sections. Section Sagraeoides, a primitive group including M. acuminatum and M. amygdalinum, is defined by the synapomorphies of ovaries

FIG. 10. Representative cladogram of Mecranium species, excluding M. plicatum and M. obtusifolium. One of 26 equally parsimonous trees.

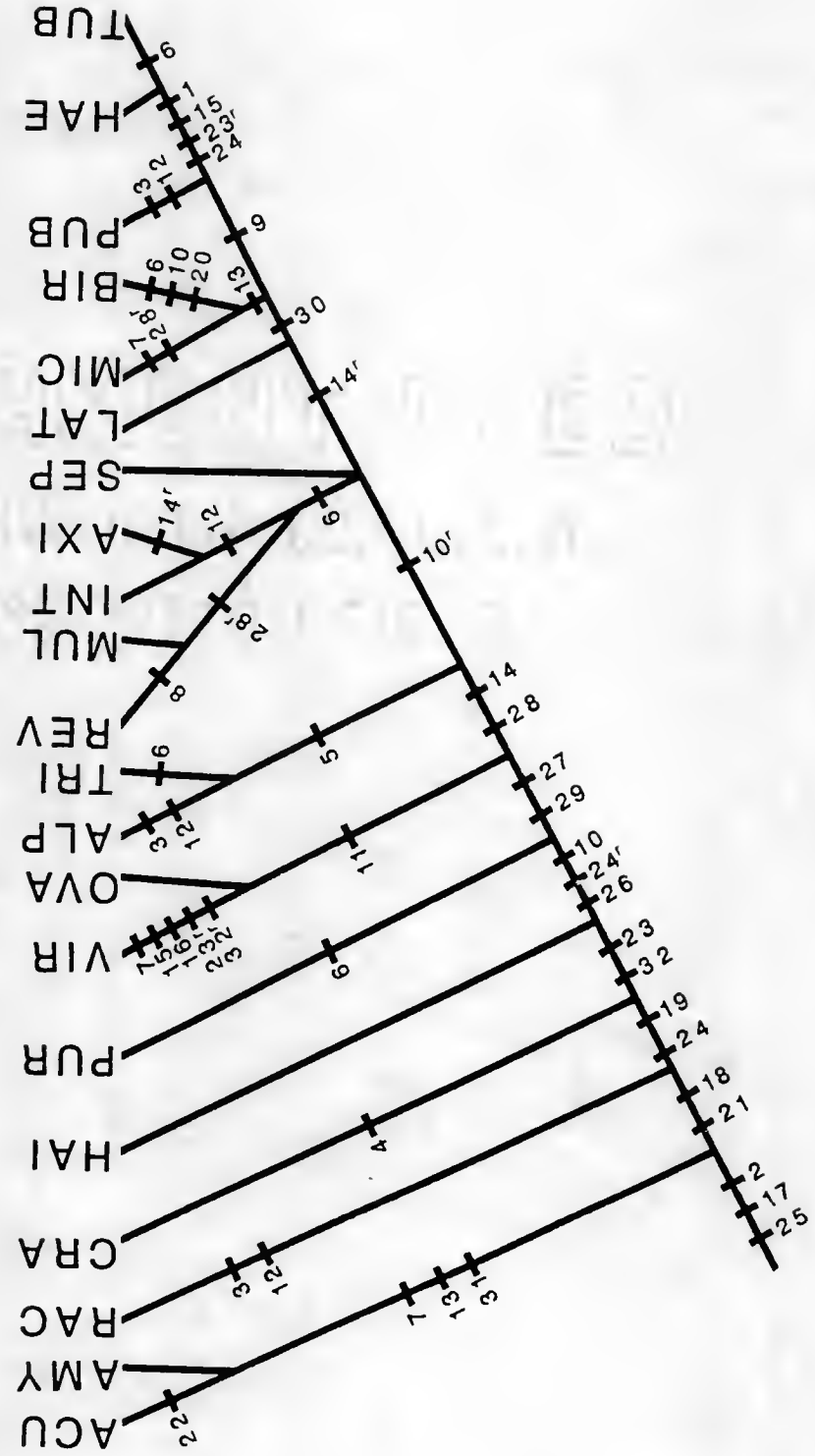
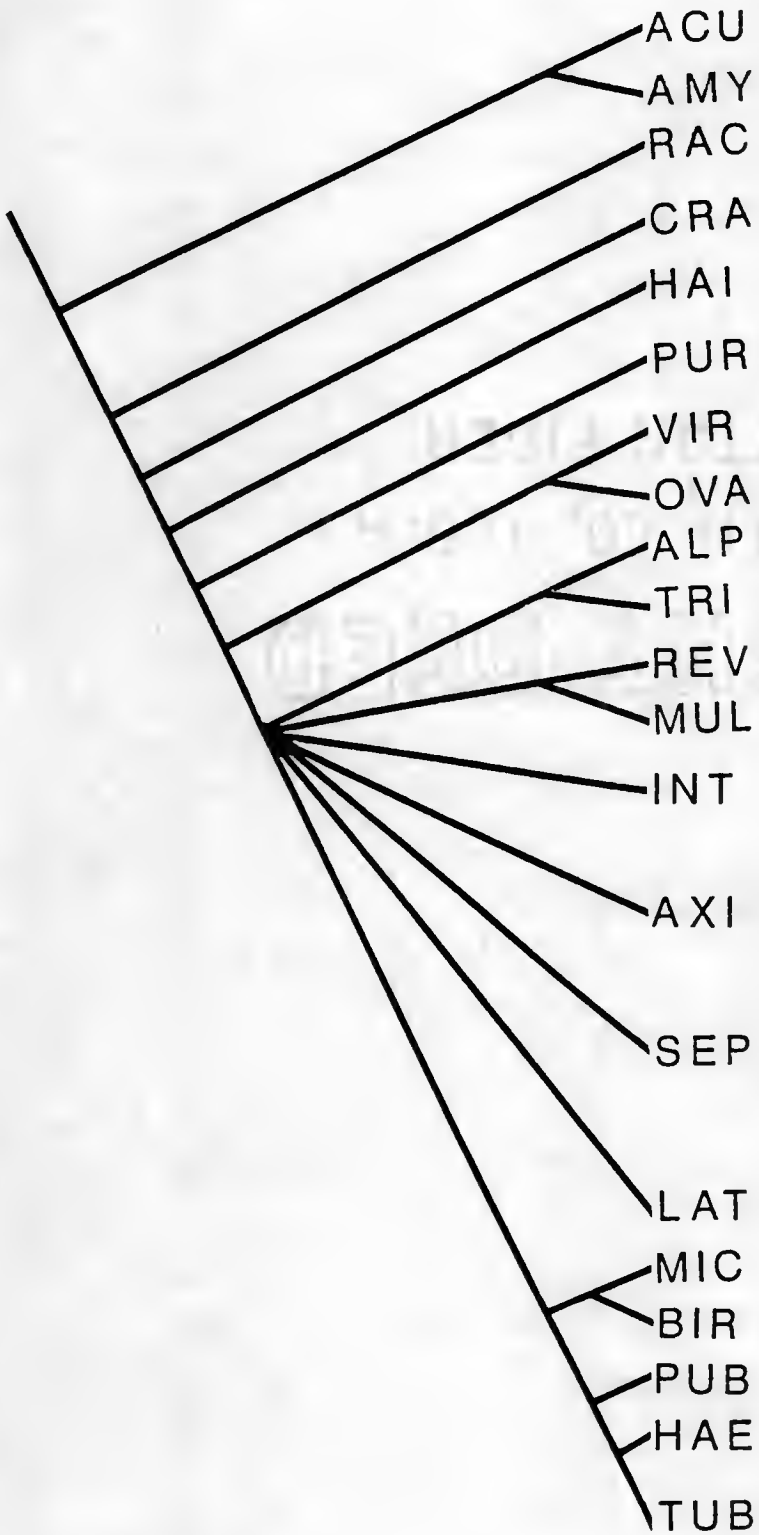

ACU
AMY
RAC
CRA
HAI
PUR
VIR
OVA
ALP
TRI
REV
MUL
INT
AXI
SEP
LAT
MIC
BIR
PUB
HAE
TUB

Fig. 11. Consensus cladogram of *Mecranium* species, excluding *M. plicatum* and *M. obtusifolium*.


ACU
AMY
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PUR
VIR
OVA
ALP
TRI
REV
MUL
INT
AXI
SEP
LAT
MIC
BIR
PUB
HAE
TUB

ca half-inferior (character 31), marsupiform mite domatia (13), and plicate leaves (7), with the latter two characters showing homoplasy. Section Mecranium, a derived group including 20 species, is defined by the synapomorphies of internal calyx lobes fused in a calyptra (18) and obovate petals with rounded, retuse apices (21), characters showing no homoplasy.

Mecranium plicatum and M. obtusifolium were excluded from this study because of incomplete knowledge of their floral structures. Mecranium plicatum is known only from the type collection, which bears immature fruits. These young fruits still have a persistent androecial fringe lining the internal surface of the hypanthium (see Fig. 55F), and therefore the species can be placed with certainty in the genus Mecranium, although its sectional affinity is unknown. The relatively large immature fruits and plicate leaves of M. plicatum suggest that the species belongs to sect. Sagraeoides, but the species lacks the marsupiform mite domatia of the two species in this section. A similar situation exists for Mecranium obtusifolium, which was known only from the type collection bearing mature fruits until it was recollected by J. Bisse and colleagues at HABJ. On a brief visit to Havana, I was able to examine some flower buds of this species and a single fragmentary anther attached to an old flower. The buds are calyptrate and the anther apparently dehisces by means of a foramen. Therefore, this species belongs in sect. Mecranium.

Anther characters are extremely important in interpreting the phylogeny of the genus. Within sect. Mecranium the six most primitive species: M. racemosum, M. crassinervum, M. haitiense, M. purpurascens, M. virgatum, and M. ovatum, have placements that are unambiguous. The first three of these species have flowers with narrowly ovate anthers that dehisce by means of a single small apical pore. These are here termed "sagraeoid" anthers because this is the common anther type in the genus Sagraea. Sagraeoid anthers are the exclusive anther type found in Mecranium sect. Sagraeoides. Mecranium purpurascens and the remaining species in sect. Mecranium have obovate anthers. In the case of M. purpurascens the anthers are slightly obovate and open by means of a single apical pore, showing an anther type intermediate between "sagraeoid" anthers and obovate "mecranioid" anthers, which are bifid at the apex and dehisce by means of two pore-like slits or a single gaping two-chambered foramen.

The species with mecranioid anthers (29) that open by a single gaping, 2-chambered apical foramen comprise a paraphyletic group here called the Mecranium multiflorum complex, s.l., which includes: M. ovatum, M. virgatum, M. tricostatum, M. alpestre, M. multiflorum, M. revolutum, M. integrifolium, M. axillare, M. septentrionale, and M. latifolium. One grouping within the resolved lineages of this complex is based on features of leaf morphology, is considered implausible, and is not supported by geography.

Mecranium virgatum and M. ovatum are linked by the relatively simple characters of glabrous vein axils on the abaxial leaf surface (11), and abaxially raised veinlets (10). Mecranium virgatum is endemic to eastern Jamaica while M. ovatum is endemic to the Sierra de Baoruco of Hispaniola. I consider this putative relationship to be based on homoplasy. If floral characters were weighted more heavily, M. ovatum probably would be linked elsewhere within the complex, since the flowers of this species are morphologically very similar to those of M. axillare, M. integrifolium, M. latifolium, M. multiflorum, M. revolutum, and M. septentrionale.

The placement of the seven terminal lineages in sect. Mecranium is ambiguous. The largest clade includes M. microdictyum, M. birimosum, M. puberulum, M. haemanthum, and M. tuberculatum, and is here termed the "Mecranium birimosum complex." The species of the M. birimosum complex have the synapomorphy of anthers that dehisce by means of two pore-like slits, with a persistent septum (30). A second clade includes M. alpestre and M. tricostatum. These species are endemic to the Massif de la Hotte of Haiti and possess the synapomorphy of reduced leaves (5). The clade comprising M. revolutum and M. multiflorum is defined by a reversal in character 28 (anther sacs < 40% of anther length). This reversal also occurs in M. microdictyum, a species belonging to the clade with well-developed anther septa. The placements of M. axillare, M. integrifolium, M. latifolium,

and M. septentrionale are ambiguous. These four species and M. multiflorum comprise a group of phenetically similar species, for convenience here called the Mecranium multiflorum complex, s.s. This group has traditionally, and incorrectly, been recognized under the name Mecranium amygdalinum. (See the discussions under Phenetic Studies, Taxonomic Philosophy, and in the taxonomic treatment under these species.)

Conclusions

It is clear from this study that Mecranium is monophyletic and that Ekmaniocharis crassinervis and Ossaea acuminata should be included in the genus. Furthermore, as a result of this cladistic analysis, Mecranium is hypothesized to comprise two sections, the basal sect. Sagraeoides, and the derived sect. Mecranium. The relationships of seven clades within sect. Mecranium remain unresolved. Within sect. Mecranium, the M. multiflorum complex, s.l., is a paraphyletic group of 10 species that each have anthers dehiscing by means of a gaping foramen, with the septum between the anther sacs torn. Derived from some taxon within the M. multiflorum complex, or sharing a most recent common ancestor with a taxon in the M. multiflorum complex, the M. birimosum complex is a monophyletic group of five species that each have anthers dehiscing by means of two pore-like slits, with the septum between the anther sacs intact.

Although this study is unsatisfying in that it fails to resolve completely the evolutionary relationships within Mecranium, it provides a framework upon which other data (e.g., chromosomal, chemical, molecular, etc.) may be tested. It is likely that computer-assisted cladistic studies of other relatively large tropical groups will show similar homoplasy and complexity.

PHENETIC STUDIES

Three species complexes pose especially difficult taxonomic problems in Mecranium: M. acuminatum--M. amygdalinum, M. haemanthum--M. tuberculatum, and the M. multiflorum complex, s.s. The taxa within these groups are very similar morphologically and are often confused. In order to evaluate more objectively the similarities and differences exhibited by taxa in these three species groups, phenetic analyses were conducted.

Principal Components Analysis (PCA) was employed using CLUSTAN, version 2.1 (Wishart 1975), a phenetics software package available at the Northeast Regional Data Center (NERDC) at the University of Florida. In the systematist's use of PCA, Operational Taxonomic Units (OTUs), in this case herbarium specimens, are ordinated on computer-generated axes. The axes or "principal components" are abstract and composed of different characters, some of which influence the axis more than others, i.e., are more "heavily loaded" on the axis. The axes serve to maximize the variability in the sample in a way that shows the greatest separation possible in the resulting plot. The resulting plots, usually of the first two or three principal components, are often used as complex multivariate "scatter diagrams," which

aid in assessing phenetic relationships of OTUs studied. The method is a useful way of describing the variability in a taxonomic group. See Abbott et al. (1985), Sneath & Sokal (1973), and Wiley (1981) for more detailed discussions of this ordination method.

In the studies below, from 26 to 50 herbarium specimens were measured, representing essentially all available collections with flowers for the taxa studied. Flowers were boiled in 50% EtOH prior to measurement or were measured as preserved in FAA. Measurement of floral characters was accomplished with the use of a Wild M5 stereomicroscope equipped with an ocular micrometer. Stamens and petals were removed before measurement, and each flower was bisected longitudinally for measurement of hypanthial, ovarial, and various other internal characters. See Fig. 4 for the details of how floral characters were measured for the phenetic analyses (as well as for the species descriptions).

Whenever possible, four measurements per specimen were made of each character. The mean of these measurements was then entered as a datum point. In some instances, when a single herbarium sheet did not supply enough material for measurement, an additional sheet of the same collection was used for supplementary material.

Mecranium acuminatum--Mecranium amygdalinum

Mecranium acuminatum and M. amygdalinum are two very closely related sister species that comprise the

phylogenetically basal sect. Sagraeoides. Mecranium acuminatum has long been known as Ossaea acuminata, because of its narrowly triangular and acuminate petals, and M. amygdalinum is a similar species with broader petals. The latter name has been misapplied variously to members of the M. multiflorum complex, s.s. See discussions under M. acuminatum and M. amygdalinum.

In this study 26 OTUs were measured for each of 33 continuously varying characters (Table 3). The resulting plot of the first two principal components (Fig. 12) shows that the two taxa exhibit a very small gap, but do not show overlap. This observation, combined with the fact that the taxa show little geographical overlap, warrants the recognition of these taxa as distinct species.

Principal Component One (PC1) is influenced heavily by the characters of petal width (character 32) and style length (18), and explains 20.3% of the variance in the sample. Principal Component Two (PC2) is influenced heavily by the characters of anther sac length (28) and the ratio of anther sac length to total anther length (29), and explains 15.5% of the variance in the sample.

Mecranium haemanthum--Mecranium tuberculatum

Mecranium haemanthum and M. tuberculatum are two purple-flowered, cauliflorous sister species that are nearly identical except for differences in leaf size, shape, and apex. Mecranium haemanthum is limited to Cuba where it is

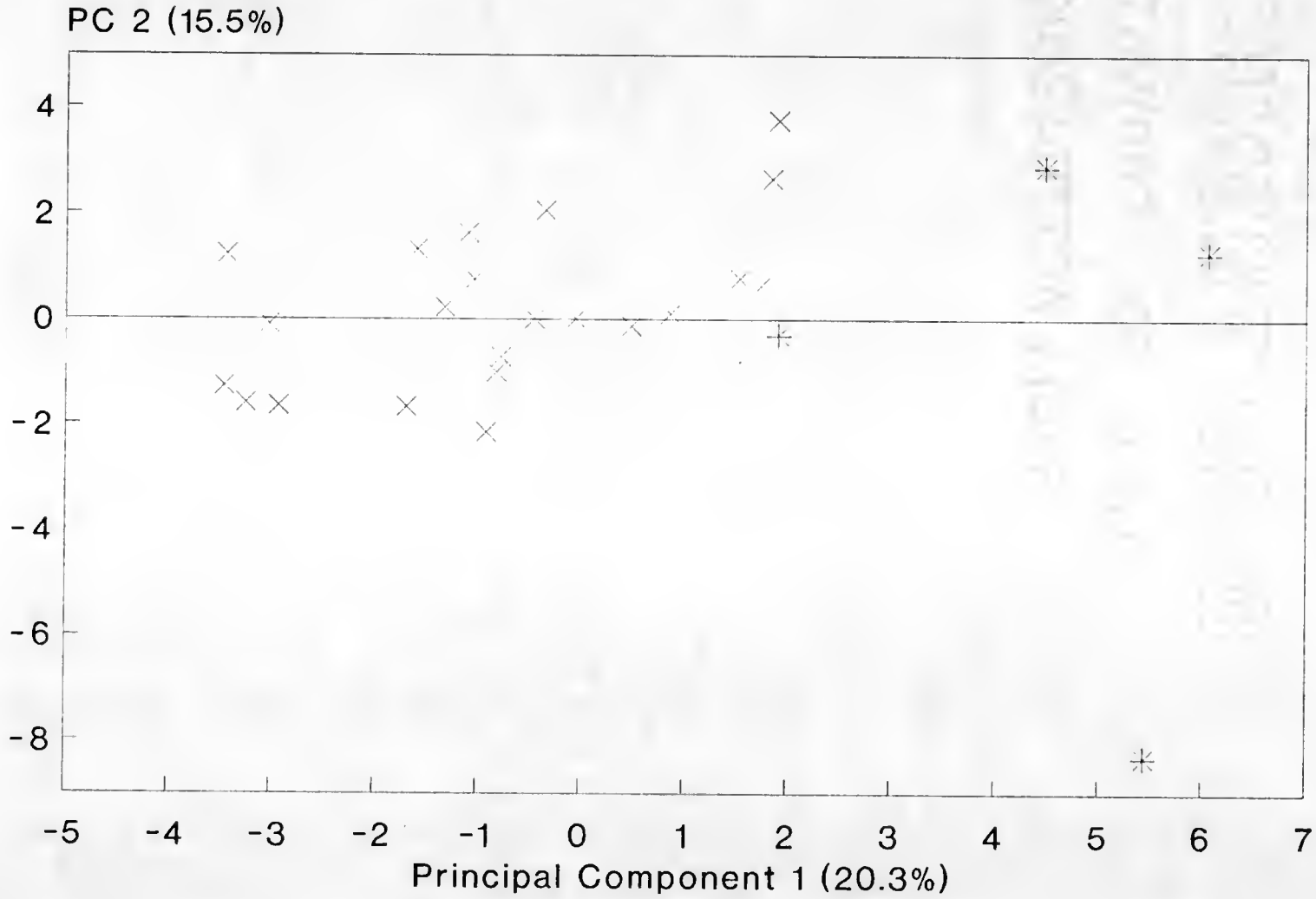
Table 3. Characters used in the phenetic analysis of *Mecranium acuminatum* and *M. amygdalinum*.

1. internode length
2. twig diameter
3. lamina length
4. lamina width
5. lamina length/lamina width
6. petiole length
7. distance from lamina base to origin of major 2° veins
8. inflorescence length
9. inflorescence width
10. inflorescence length/inflorescence width
11. peduncle length
12. peduncle length/inflorescence length
13. hypanthium length
14. hypanthium length free
15. non-membranous calyx length
16. ovary length
17. ovary appendage length
18. style length
19. hypanthium width
20. ovary width
21. ovary appendage width
22. style width
23. stigma width
24. androecial fringe height
25. stamen proximal segment (filament) length

Table 3--continued.

26. stamen proximal segment (filament) width
27. stamen distal segment (anther) length
28. anther sac length
29. anther sac length/anther length
30. stamen distal segment (anther) width
31. petal length
32. petal width
33. petal length/petal width

Fig. 12. Plot of the first two principal components resulting from the analysis of 30 vegetative and floral characters in Mecranium acuminatum (X) and M. amygdalinum (*).


PC 2 (15.5%)
4
2
0
-2
-4
-6
-8
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
Principal Component 1 (20.3%)

widespread, while M. tuberculatum occurs in the Sierra Maestra of Cuba as well as on southern Hispaniola, i.e., in the Massif de la Hotte and Massif de la Selle. The leaves of M. tuberculatum are usually shorter, broader, and with more rounded apices than those of M. haemanthum. Plants of M. tuberculatum also have stems that are slightly more roughened than those of M. haemanthum, but this character was difficult to quantify with the limited material available, and was excluded from the phenetic study.

In this study nine characters (Table 4) were measured for each of 58 OTUs. Here the OTUs are leaves, most of which were measured during a brief visit to HAJB. The resulting plot of these OTUs is illustrated in Fig. 13, and indicates that M. haemanthum and M. tuberculatum are phenetically distinct. The leaves of plants from western Cuba have the largest, most acuminate leaves. These plants may represent an undescribed subspecies of M. haemanthum, but more collections and field studies of populations are needed.

Principal Component One (PC1) is influenced heavily by the characters of length from widest point of leaf to leaf apex (5) and lamina length (1), and explains 51% of the variance in the sample. Principal Component Two (PC2) is influenced heavily by the characters of lamina width (2) and the angle of the leaf apex (9), and explains 23.7% of the variance in the sample.

Table 4. Characters used in the phenetic analysis of *Mecranium haemanthum* and *M. tuberculatum*.

1. lamina length
2. lamina width
3. lamina length/lamina width
4. length from lamina base to widest point of lamina
5. length from widest point of lamina to lamina apex
6. leaf shape index = character 5/character 6
7. petiole length
8. petiole length/lamina length
9. angle of leaf apex

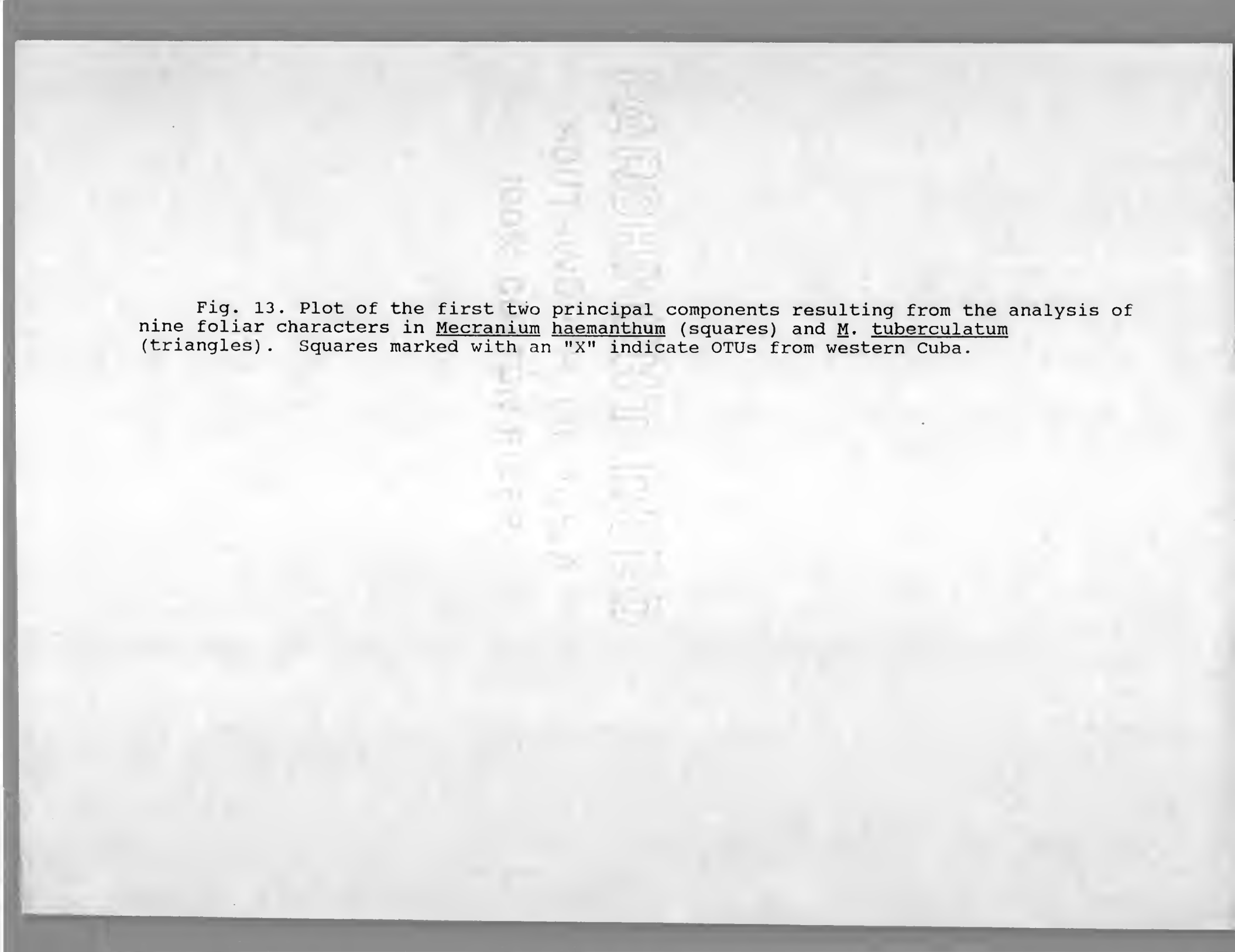
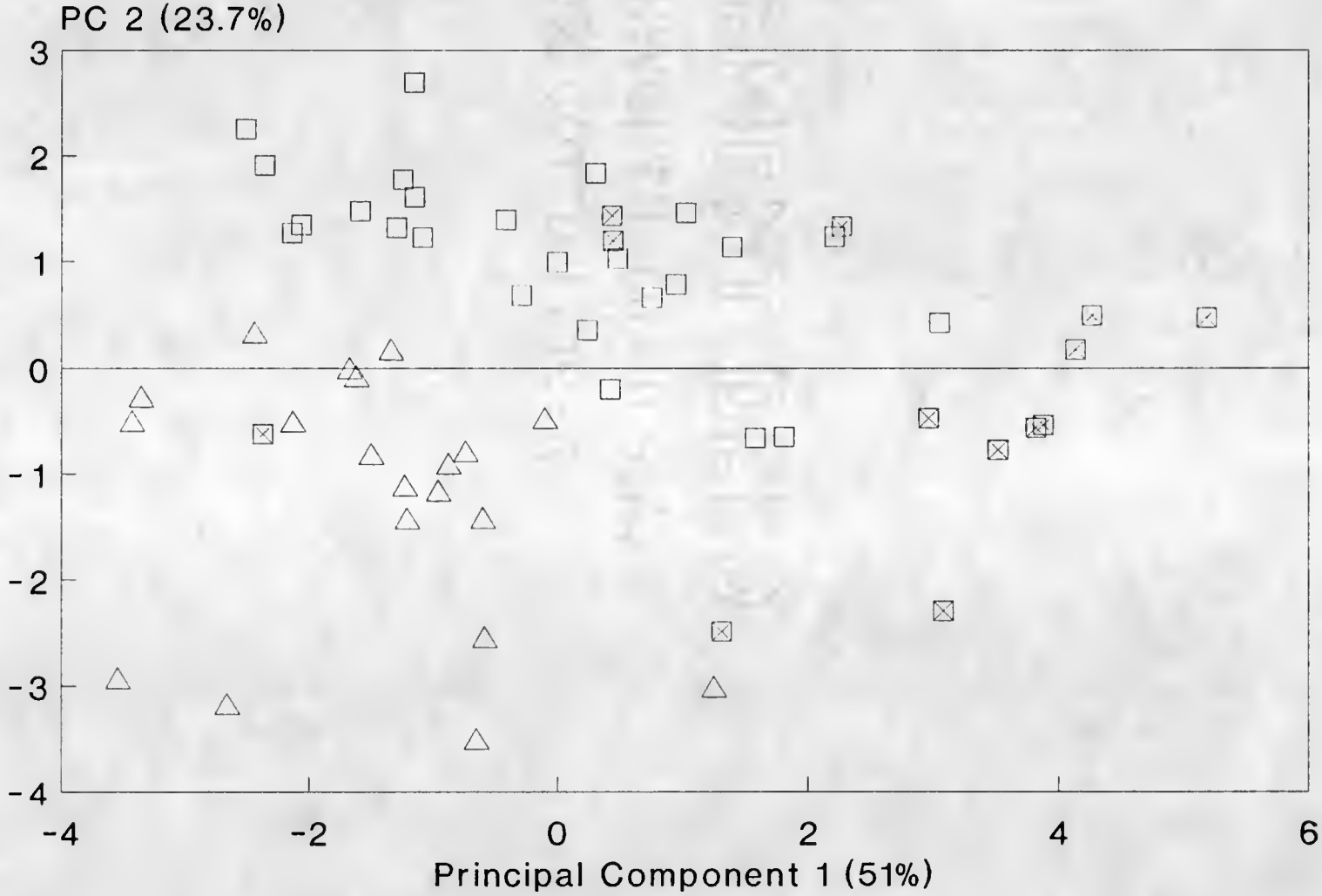


Fig. 13. Plot of the first two principal components resulting from the analysis of nine foliar characters in Mecranium haemanthum (squares) and M. tuberculatum (triangles). Squares marked with an "X" indicate OTUs from western Cuba.


PC 2 (23.7%)
3
2
1
0
-1
-2
-3
-4
-4
-2
0
2
4
6
Principal Component 1 (51%)

The Mecranium multiflorum complex, s.s.

The Mecranium multiflorum complex, s.l., is a paraphyletic group that includes all species with bifid anther apices and anthers that dehisce by means of a single, gaping 2-chambered foramen, with the septum between the anther sacs torn. Five of the species in the group are similar phenetically and have been treated as a single, widespread, polymorphic species, recognized erroneously under the name M. amygdalinum (see discussion under Taxonomic Philosophy). This group of phenetically similar species is called the M. multiflorum complex, s.s.

The M. multiflorum complex, s.s., is represented by M. axillare, a species endemic to Jamaica, M. integrifolium, a species found on northern Hispaniola and Cuba, M. latifolium, a species endemic to Puerto Rico, M. multiflorum, a species endemic to southern Hispaniola, and M. septentrionale, a species endemic to the Cordillera Septentrional of Hispaniola. These species can be recognized on the basis of differences in leaf size and shape, vein impression, various components of flower size, twig indumentum, and leaf pubescence (see Key).

In the first study comparing all members of the complex, 50 OTUs were measured for each of 40 vegetative and floral characters (Table 5). All of these characters represented continuous measurements, except for characters

Table 5. Characters used in the phenetic analysis of the *Mecranium multiflorum* complex, *s.s.*

1. internode length
2. twig diameter
3. internodal vestiture (1-3)
4. lamina length
5. lamina width
6. lamina length/lamina width
7. length from lamina base to widest point of lamina/length from widest point of lamina to lamina apex
8. lamina margin-number of teeth/cm
9. margin tooth height
10. length from lamina base to origin of major 2° veins
11. degree of 3° vein impression (1-3)
12. density of tuft hairs (1-6)
13. lamina revoluteness at base (1-3)
14. petiole length
15. inflorescence length
16. inflorescence width
17. inflorescence length/width
18. peduncle length
19. peduncle length/inflorescence length
20. hypanthium length
21. hypanthium length free
22. non-membranous calyx length
23. ovary length
24. ovary appendage length

Table 5--continued.

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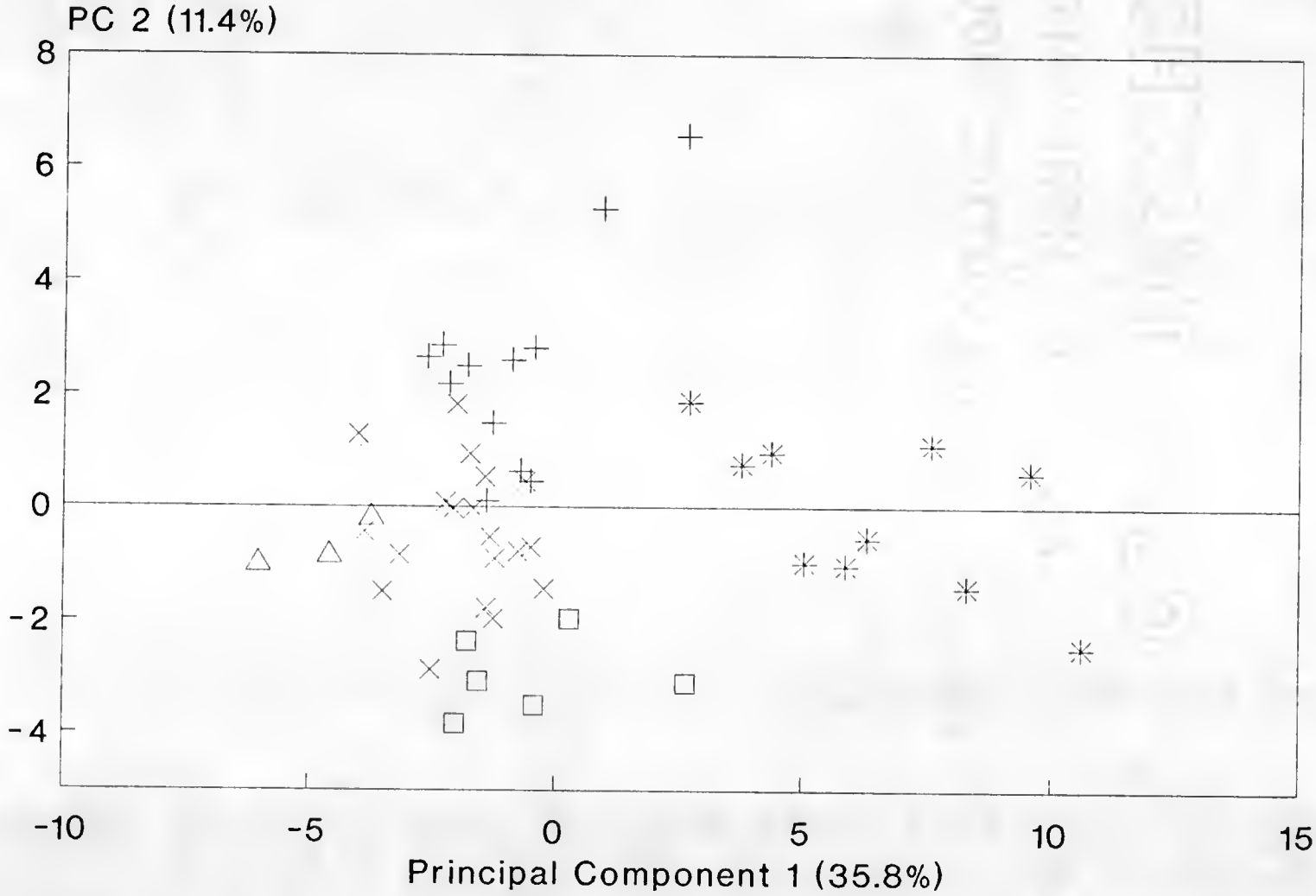
25. style length
26. hypanthium width
27. ovary width
28. ovary appendage width
29. style width
30. stigma width
31. androecial fringe height
32. stamen proximal segment (filament) length
33. stamen proximal segment (filament) width
34. stamen distal segment (anther) length
35. anther sac length
36. anther sac length/anther length
37. stamen distal segment (anther) width
38. petal length
39. petal width
40. petal length/width

three, 11, 12, and 13, which were scored carefully and comparatively on graded scales.

The resulting plot of the first two principal components (Fig. 14) clearly indicates that M. latifolium, the Puerto Rican taxon, represented by asterisks, is distinct phenetically from the other members of the group. Principal Component One (PC1) is influenced heavily by the characters of anther length (34), hypanthium width (26), and hypanthium length (20), explaining 35.8% of the variance in the sample. Principal Component Two (PC2) is influenced heavily by the characters of inflorescence length (15), lamina length (4), and petiole length (14), explaining 11.4% of the variance in the sample. The phenetic overlap exhibited by the other species in the complex is less meaningful considering that the ability of PCA to separate OTUs is lessened by the presence of widely discordant elements, such as the OTUs of M. latifolium.

The second study (Fig. 15) compared the members of the complex occurring on the islands of Cuba and Hispaniola using the same 40 characters as in the previous study of all taxa. In this study M. multiflorum, represented by squares, is shown to be the most phenetically distinct, while M. integrifolium and M. septentrionale show only a small phenetic gap. Principal Component One and PC2 explain 22.1% and 15% of the variance in the sample, respectively. Characters heavily loaded on PC1 include hypanthium width (26), hypanthium length (20), and ovary length (23).

Fig. 14. Plot of the first two principal components resulting from the analysis of 40 vegetative and floral characters in the five species of the Mecranium multiflorum complex, s.s.: M. axillare (+), M. integrifolium (x), M. latifolium (*), M. multiflorum (squares), M. septentrionale (triangles).


PC 2 (11.4%)
8
6
4
2
0
-2
-4
-10
-5
0
5
10
15
Principal Component 1 (35.8%)

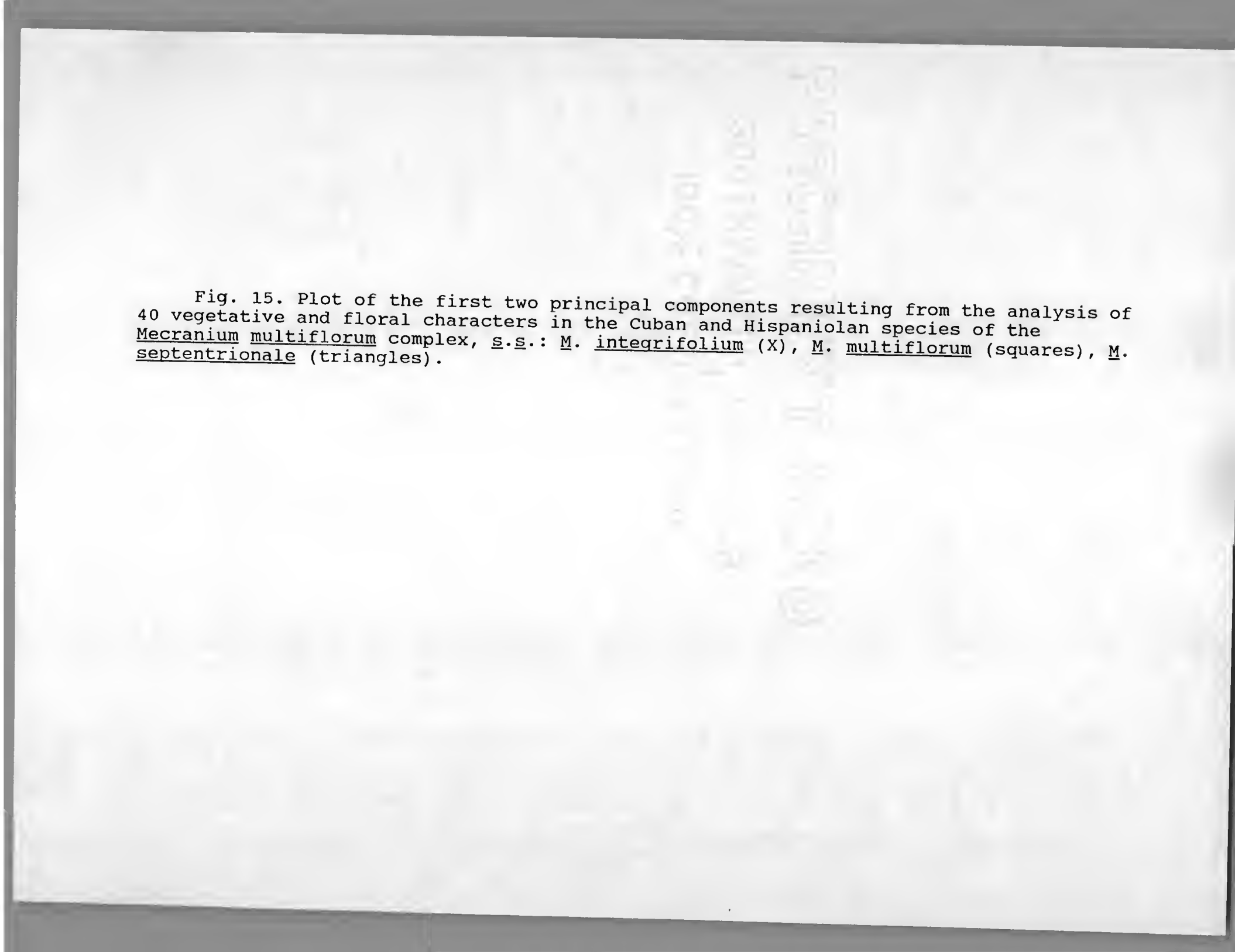
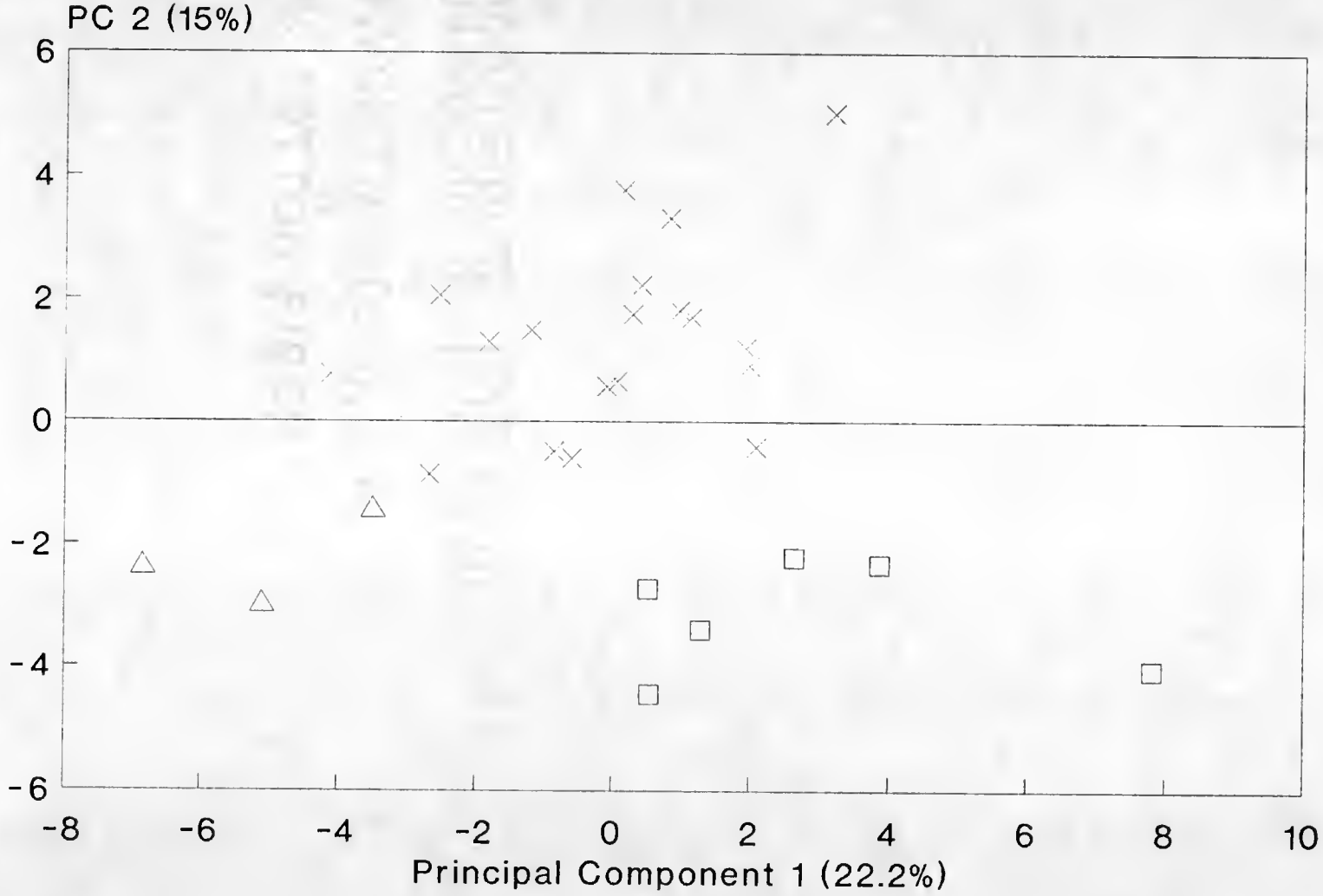


Fig. 15. Plot of the first two principal components resulting from the analysis of 40 vegetative and floral characters in the Cuban and Hispaniolan species of the Mecranium multiflorum complex, s.s.: M. integrifolium (X), M. multiflorum (squares), M. septentrionale (triangles).


PC 2 (15%)
6
4
2
0
-2
-4
-6
-8
-6
-4
-2
0
2
4
6
8
10
Principal Component 1 (22.2%)

Characters strongly influencing PC2 include the ratio of anther sac length to anther length (36), anther sac length (35), and the leaf shape index--the ratio of the length from the lamina base to the widest point of the lamina to the length from the widest point of the lamina to the lamina apex (7).

These studies show that species of the M. multiflorum complex, s.s., are delimited by small but consistent morphological gaps.

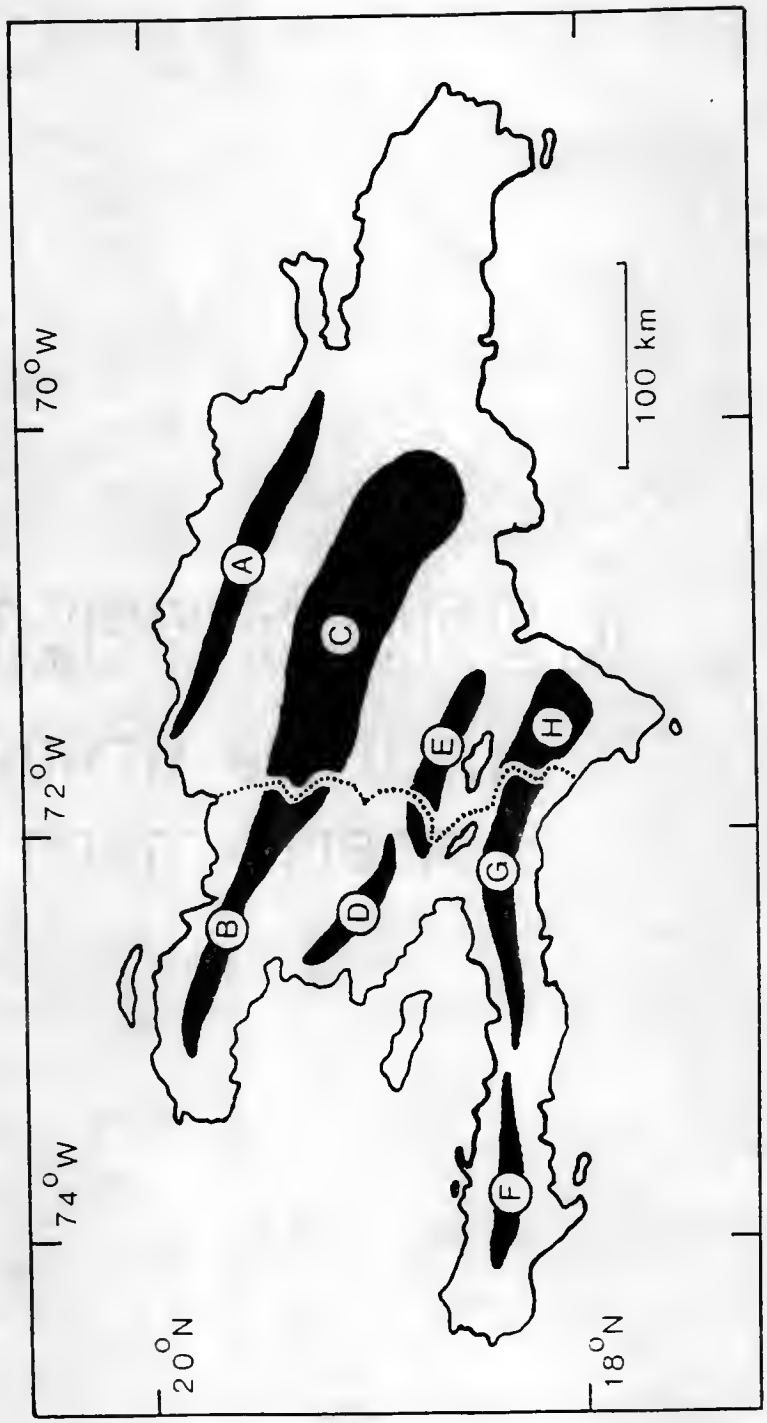
PHYTOGEOGRAPHY

Species of Mecranium have been documented only from the Greater Antillean islands of Cuba, Hispaniola, Jamaica, Puerto Rico, and nearby St. Thomas. Erroneous reports of Mecranium from Venezuela (Stahl 1883, 1886) are probably based on another melastome, Necramium gigantophyllum Britton, due to its confusingly similar name.

Howard (1973) listed two genera of 20 or more species that are endemic to the Greater Antilles: Calycogonium DC. (ca. 30 spp., Melastomataceae) and Wallenia Sw. (ca. 25 spp., Myrsinaceae). Mecranium, with 23 species, may be placed in this category as well. The three genera are similar in being woody, fleshy-fruited, and largely montane, but each has its center of diversity on a different Greater Antillean island. Calycogonium is most diverse on Cuba, Wallenia on Jamaica, and Mecranium on Hispaniola. Sixteen species of Mecranium occur on Hispaniola, and fourteen are endemic to the island. Five species of Mecranium occur on Cuba, and three of these are endemic. Only three species of Mecranium, all endemic, are found on Jamaica. A single endemic species, M. latifolium, is found on Puerto Rico, and has been documented from St. Thomas by a single early 19th-century collection.

On Hispaniola (Fig. 16), Mecranium is most diverse in the Massif de la Hotte of Haiti (Fig. 16F), where ten species are found, seven of which are endemic to this mountain range, i.e., M. alpestre, M. crassinervum, M. haitiense, M. microdictyum, M. plicatum, M. revolutum, and M. tricostatum. The Haitian and Dominican names of mountain ranges in this monograph follow Zanoni (1986b). Following the Massif de la Hotte in Mecranium species richness is the Massif de la Selle-Sierra de Baoruco (Figs. 16H, 16G). Six species occur here, and one, M. ovatum, is endemic. Mecranium ovatum is restricted to the Sierra de Baoruco (Fig. 16H). Together the Massif de la Hotte and Massif de la Selle-Sierra de Baoruco comprise the major mountains on the "south island" of Hispaniola, i.e., the region south of the Plaine du Cul de Sac-Enriquillo Depression, a low xeric plain ca 20 km wide that extends some 90 km northwest to southeast from Port-au-Prince, Haiti to Barahona in the Dominican Republic. This region can be seen easily in Fig. 16 since it contains two major saline lakes, Etang Sumatre to the west in Haiti, and Lago Enriquillo to the east in the Dominican Republic. The terms "south island" and "north island" are used to describe these regions because some geologists believe that they were once separate land masses (see discussion below). Thirteen species of Mecranium occur on "south island" Hispaniola; ten of these are endemic to the this region, among those M. birimosum and M. multiflorum, which were not mentioned above.

Fig. 16. Major mountains on Hispaniola where Mecranium species occur. A. Cordillera Septentrional. B. Massif du Nord. C. Cordillera Central. D. Montagnes Noires. E. Sierra de Neiba. F. Massif de la Hotte. G. Massif de la Selle. H. Sierra de Baoruco.


70°W
72°W
74°W
20°N
18°N
100 km
A
B
C
D
E
F
G
H

To the north of the Cul de Sac Plain, i.e., the "north island" of Hispaniola, mountainous terrain is more extensively developed, but these mountains harbor only five species of Mecranium, two of them endemic to the north island. Three species of Mecranium occur in the Massif du Nord-Cordillera Central (Figs. 16B, 16C), but only one, M. puberulum, is endemic to this mountain range. The other two taxa, M. acuminatum and M. integrifolium subsp. neibense, are more widespread. Mecranium acuminatum is also found in the Cordillera Septentrional (Fig. 16A), as well as in the Sierra de Neiba (Fig. 16E), and one of its Haitian extensions, the Montagnes Noires (Fig. 16D). A single collection of this species is known from the south island in the Sierra de Baoruco. In addition to being found in the Massif du Nord-Cordillera Central, M. integrifolium subsp. neibense also occurs in the Sierra de Neiba. This species is one of only two species of Mecranium that is found on more than one of the four major islands. It is represented in the mountains of central and eastern Cuba by M. integrifolium subsp. integrifolium, and M. integrifolium subsp. alainii. The narrow endemic Mecranium septentrionale is limited to the region of Pico Diego de O'Campo in the Cordillera Septentrional. A fifth species, M. amygdalinum, which is common on the south island in the Massif de la Selle, is known on the north island from two collections made in the low hills near Santo Domingo.

On Cuba (Fig. 17) Mecranium exhibits a distribution that corresponds largely to the distribution of the major mountain ranges on the island. Three species of Mecranium are found in the western Cordillera de Guaniguanico (Fig. 17A), which includes the Sierra de los Organos and the Sierra del Rosario. They are: M. haemanthum, M. obtusifolium, and M. racemosum. The latter two are endemic to this region. Mecranium haemanthum shows a disjunct distribution on Cuba, with western populations also in Loma de la Coca, near Campo Florido, some 25 km east of Havana, and eastern populations in the Cordillera del Turquino (Fig. 17D), and the mountains of Holguín and Guantánamo Provinces (Fig. 17H), which are detailed in Fig. 18: the Meseta del Guaso (Fig. 18E), Sierra del Cristal (Figs. 18D), Cuchillas de Baracoa (Fig. 18J), Sierra del Purial (Fig 18K), Sierra de Imías (Fig. 18L), and Cuchillas de Toa (Fig. 18G), which includes the Sierra de Frijol (Fig. 18H). In the eastern part of the island two other species of Mecranium are found, neither of which is endemic. Mecranium tuberculatum, a species also represented on the south island of Hispaniola, occurs at elevations above 700 m in the Cordillera del Turquino. Finally, M. integrifolium, which is represented by subsp. neibense on the north island of Hispaniola, is represented by two endemic subspecies on Cuba. Mecranium integrifolium subsp. integrifolium is found in central Cuba in the Alturas de Trinidad and Alturas de Sancti Spiritus (Figs. 17B, 17C), and in the eastern portion of the island

Fig. 17. Major mountains on Cuba where Mecranium species occur. A. Cordillera de Guaniguanico. B. Alturas de Trinidad. C. Alturas de Sancti Spiritus. D. Cordillera del Turquino. E. Cordillera de la Gran Piedra. F. Sierra de Nipé. G. Sierra del Cristal. H. Eastern mountains of Holguín and Guantánamo Provinces (detailed in Fig. 18).

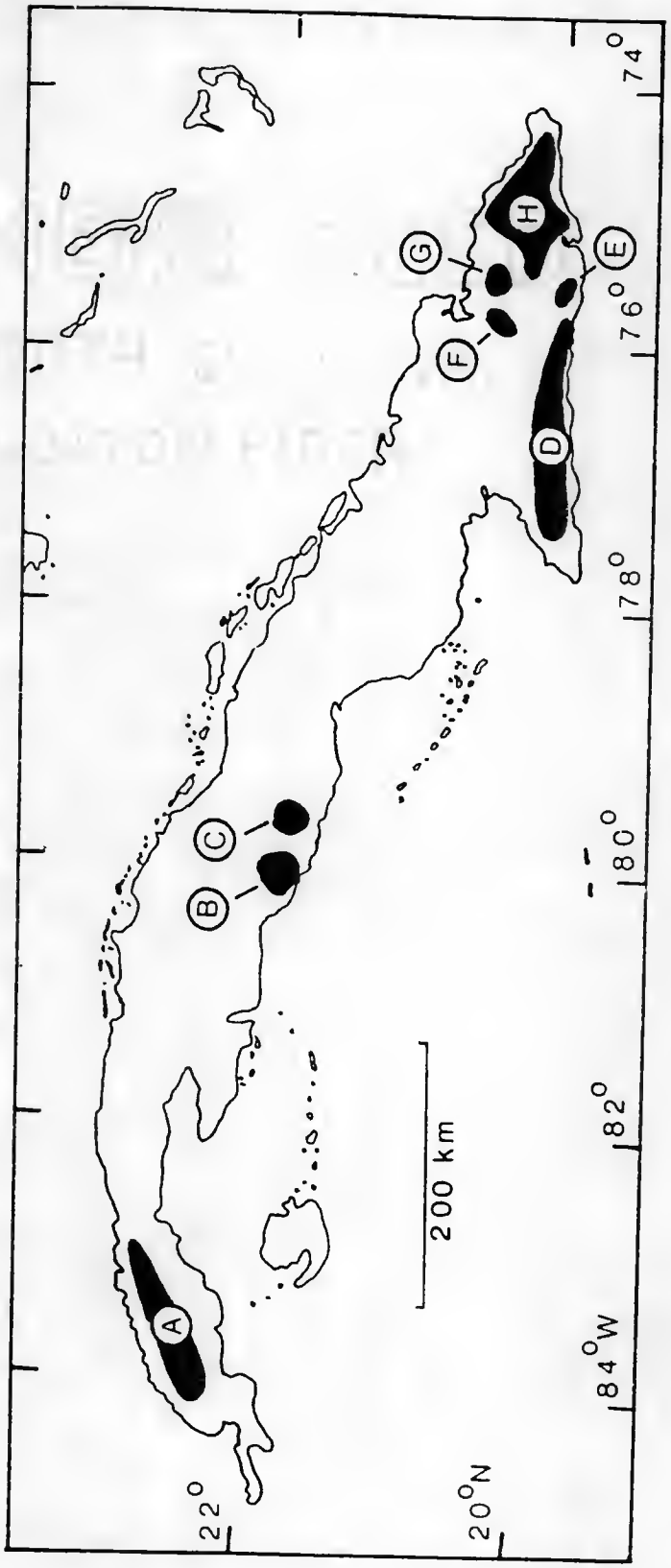
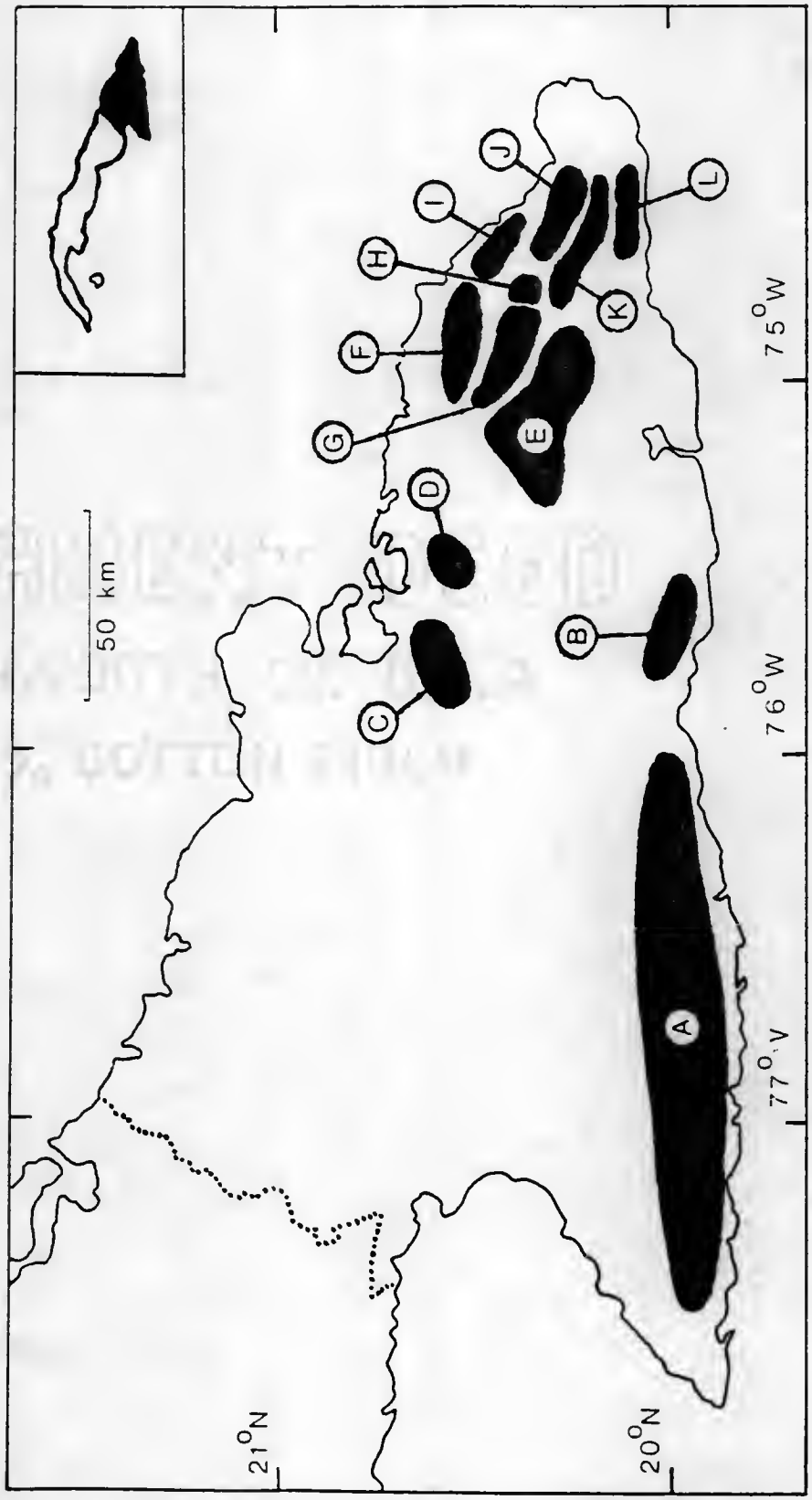

A
B
C
D
E
F
G
H
200 km
22°
20°N
84°W
82°
80°
78°
76°
74°

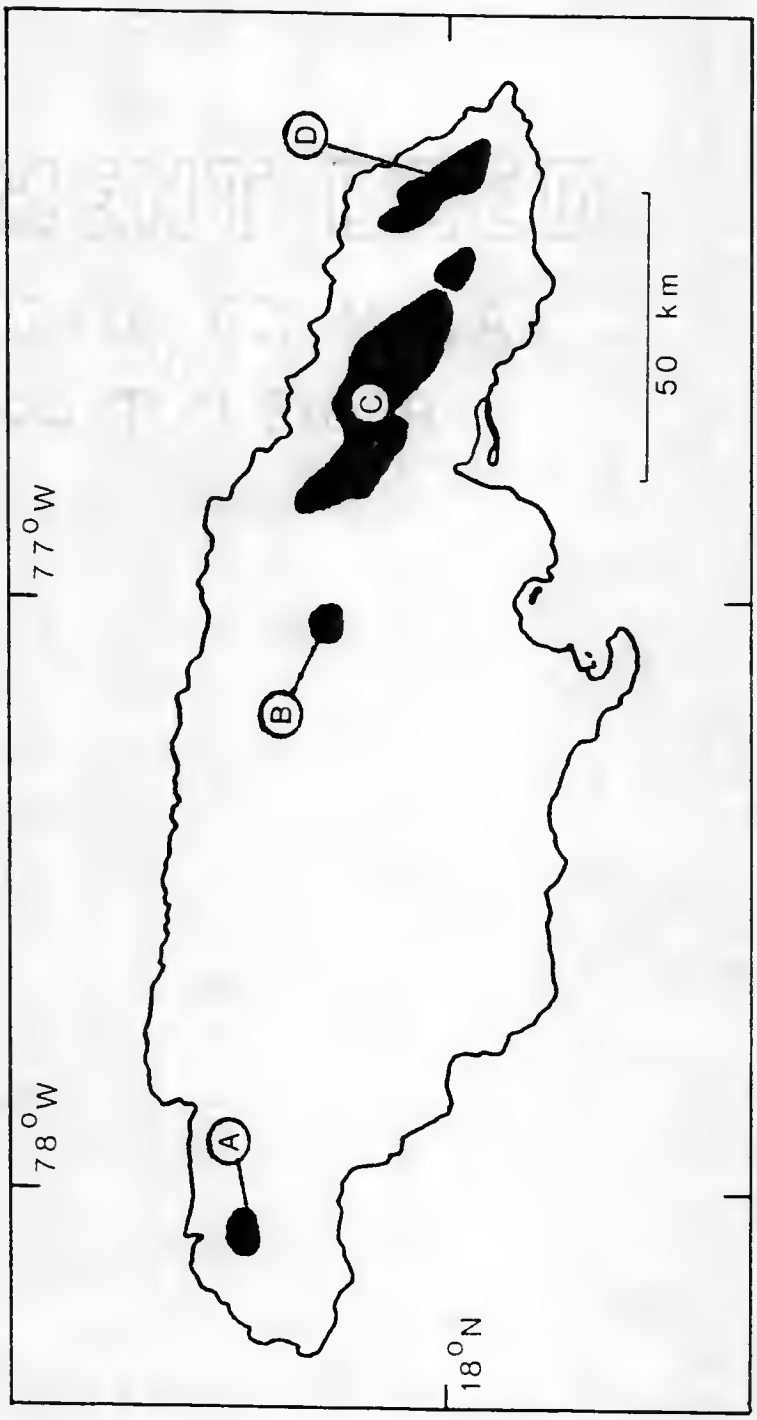
Fig. 18. Detail of major mountains on eastern Cuba where Mecranium species occur. A. Cordillera del Turquino. B. Cordillera de la Gran Piedra. C. Sierra de Nipé. D. Sierra del Cristal. E. Meseta del Guaso. F. Cuchillas de Moa. G. Cuchillas de Toa. H. Sierra de Frijol. I. Alturas de Baracoa. J. Cuchillas de Baracoa. K. Sierra del Purial. L. Sierra de Imías.


A
B
C
D
E
F
G
H
I
J
K
L
50 km
21°N
20°N
77°W
76°W
75°W

in the Sierra Maestra, i.e., the Cordillera del Turquino and Cordillera de la Gran Piedra (Figs. 17E, 18A), and the Meseta del Guaso. In contrast, M. integrifolium subsp. alainii is endemic to the mountains of Holguín and Guantánamo Provinces: the Sierra de Imías, Sierra del Purial, Cuchillas de Moa (Fig. 18F), Alturas de Baracoa (Fig. 18I), Cuchillas de Toa, Sierra del Cristal, and Altiplanicie de Nipé (Figs. 17F, 18C). The Cuban names of mountain ranges in this monograph follow "Instituto Cubano de Geodesía y Cartografía" (1978).

On Jamaica (Fig 19) where Mecranium is represented by three endemic species, the greatest diversity is exhibited in the Blue Mountains (Fig. 19C), including the Port Royal Mountains, where all three species occur. Mecranium purpurascens is endemic to this range. The other two species found on the island, M. axillare and M. virgatum, are more widespread. Mecranium virgatum is also found to the east in the foothills and lower slopes of the John Crow Mountains (Fig. 19D), as well as in central Jamaica in Clarendon Parish and in the Red Hills of St. Catherine Parish. Mecranium axillare is the most widespread of the Jamaican species, and is represented by three subspecies. Mecranium axillare subsp. axillare is found in the Blue Mountains as well as to the west in the region of Mt. Diablo (Fig. 19B). Mecranium axillare subsp. proctori is limited to the John Crow Mountains (Fig. 19D), and the "Big Level" area southeast of this range. Finally, M. axillare subsp.

Fig. 19. Major regions on Jamaica where Mecranium species occur. A. Dolphin Head. B. Mount Diablo. C. Blue Mountains, including the Port Royal Mountains. D. John Crow Mountains.


D
C
B
A
77°W
78°W
18°N
50 km

urbanianum is found in the western part of the island at Dolphin Head (Fig. 19A), and at several more eastern localities in the Parishes of Clarendon and Trelawny.

On Puerto Rico, the endemic species, M. latifolium is widespread in mountainous regions, occurring from the western part of the Cordillera Central to the Sierra de Luquillo in the east.

When the consensus cladogram illustrating the hypothetical relationships of Mecranium species (Fig 11) is considered in light of the documented distributions of these species, several interesting comparisons can be made. Section Sagraeoides, the primitive group that comprises two species, M. amygdalinum and M. acuminatum, is endemic to Hispaniola. The two closely related species show a south island-north island disjunction pattern, with some very slight overlap that may be attributed to recent dispersal events. A similar pattern can be visualized within sect. Mecranium in the relationships of the clade containing species with anthers that open by slits, the M. birimosum complex. Mecranium birimosum and M. microdictyum, south island basal members of the clade, appear most closely related to M. puberulum, a north island species endemic to the Cordillera Central. The latter is apparently most closely related to M. haemanthum and M. tuberculatum, two sister species found on Cuba. Mecranium tuberculatum, on Cuba found only in the Cordillera del Turquino, also occurs on south island Hispaniola in both the Massif de la Hotte

and Massif de la Selle. It should be noted that no species of Mecranium occurs extensively in both northern and southern Hispaniola. In other words, for Mecranium it appears that past and recent physiographical barriers separating the north and south "islands" of Hispaniola have been (and are) as effective as those presently separating the Greater Antillean islands.

A second comparison can be made with respect to the geographical distributions of the relatively primitive species of Mecranium with sagraeoid anthers that open by small apical pores. This paraphyletic group includes the two species in sect. Sagraeoides and four species included in sect. Mecranium: M. racemosum, M. crassinervum, M. haitiense, and M. purpurascens. The latter actually has slightly obovate anthers, but they still open by means of a single small apical pore. Of these six primitive species, four are endemic to Hispaniola, one is endemic to Cuba, and one is endemic to Jamaica.

A third pattern, a Cuba-Hispaniola link, is evident in the distributions of the two species that span more than one Greater Antillean island. As mentioned above, M. tuberculatum occurs in the upper elevations of the Cordillera del Turquino as well as on the south island of Hispaniola. Mecranium integrifolium is represented by three subspecies, subsp. neibense on north island Hispaniola, subsp. integrifolium in the mountains of central and

southeastern Cuba, and subsp. alainii in the northern mountains of eastern Cuba.

Although the geographical distributions of Mecranium species could be explained solely by stochastic dispersal events, it is likely that vicariant events have played an important role in present-day distributions. Rosen (1975) proposed the first comprehensive vicariance model for the biota of the Greater Antilles, which suggested that the present biota had resulted from fragmentation from the biota of a "Proto-Antilles" archipelago that existed between North and South America in the Mesozoic. The existence of such an island arc is supported by the work of many geologists (e.g., Ladd 1976, Malfait and Dinkleman 1972, Pindell and Dewey 1982). In general terms, they suggest that, in late Cretaceous time, the Caribbean region was part of an East Pacific plate wedged between the North and South American blocks. What would later become the Greater Antilles, the Proto-Antilles, was carried northeastward on this East Pacific-Caribbean plate until it collided with Florida and the Bahama platform in the late Eocene. Soon afterward (ca. 40 mya), there were major tectonic changes that resulted in what is now known as the Caribbean plate (Coney, 1982).

Although the basic tenets of the Proto-Antilles model are accepted widely, the composition and historical relationships of the different land masses are disputed. Pindell and Dewey (1982) and Sykes et al. (1982) argue that the land masses that would later become Jamaica and south

island Hispaniola "lagged behind" the bulk of the Proto-Antilles arc, remaining isolated from one another and closely associated with the North American block in the area of present-day Yucatán. According to these workers, creation of the Mid Cayman spreading center in the Eocene (Perfit and Heezen, 1978) and subsequent seafloor spreading carried Jamaica and southwest Hispaniola ca 1400 km northeast until south island Hispaniola collided with the bulk of the island ca 9-10 mya. This scenario is illustrated clearly in Guyer and Savage (1986, Fig. 10), who applied it in their studies of anoles (Sauria: Iguanidae).

The geologic history of the Greater Antilles is further complicated by the belief that the islands of Hispaniola and Cuba probably were formed by accretion of different land masses. According to Pindell and Dewey (1982), Cuba is a composite of what were once at least three different islands, the easternmost of which was formerly accreted to northern Hispaniola as recently as the Oligocene, with southeastern Cuba and northern Hispaniola remaining in close proximity until the Pliocene. Hispaniola apparently comprises at least four different land masses: the older core of north island Hispaniola, the south island, which collided with the core of north island Hispaniola in the Pliocene, a blueschist terrain in extreme northeast Hispaniola that collided with the core of north island Hispaniola in middle to late Eocene, and a small piece of the Bahama bank transferred from the North American plate to

northeast Hispaniola in the last few million years (Sykes et al. 1982).

The ancestral species that gave rise to Mecranium possibly was isolated on the south island of Hispaniola, underwent an extensive adaptive radiation as the island was moved toward the bulk of the Greater Antilles, and was subsequently dispersed to Jamaica, north island Hispaniola, Puerto Rico, and Cuba. This taxon, probably derived from some clade within Sagraea, may have had its seeds carried by frugivorous birds to the Proto-Antilles from North or South America, or could have been isolated on the Antilles through vicariance events. Although such statements on isolation by vicariance or dispersal are speculative, the high diversity of Mecranium species on south island Hispaniola, and the relative paucity of species on north island Hispaniola, suggest an historical isolation greater than the ca 20 km-wide xeric plain currently separating these areas. Thirteen species of Mecranium occur on the south island; ten of these are endemic. Five species of Mecranium occur on the north island; only two of these are endemic. Furthermore, the present distribution of relatively primitive species suggests a south island origin for Mecranium. Of the species with sagraeoid anthers, four are found on the south island, where two are endemic, and two are found on the north island, neither endemic. Other complexities of the geologic history also may come into play. Certainly the possible Miocene-Pliocene close proximity of north island

Hispaniola and Cuba could have contributed to the Cuba-Hispaniola link discussed above. In addition to the presence of Mecranium integrifolium on both north island Hispaniola and Cuba, M. puberulum, a species endemic to the Cordillera Central-Massif du Nord of the north island, is most closely related to M. haemanthum, a widespread Cuban endemic and sister species of M. tuberculatum.

Other workers feel that the north and south islands of Hispaniola formed in situ. Maurrasse (1982) believes the north island formed from an island-arc system or systems active in the Mesozoic, and that the south island was formed in late Cretaceous time by back-arc spreading from a hypothetical spreading center located in what is now the Cul de Sac-Enriquillo Depression. His hypothesis also calls for the subdivision of Hispaniola into smaller "islands," due to deep-water marine basins existing in what are now lowland areas. Maurrasse believes that Hispaniola was uplifted from the Eocene, when only portions of the Massif du Nord-Cordillera Central were emergent, to late Pleistocene, when all present mountain ranges were emergent. This scenario calls for seaways between all the major mountain ranges until at least the late Pliocene, perhaps until the late Pleistocene. These seaways would have included one in the present Trouin Valley between the Massif de la Selle and Massif de la Hotte, which would have isolated the latter from the rest of the island. In my opinion, the Trouin Valley is an important phytogeographical barrier for

Mecranium, but not as important as the Cul de Sac-Enriquillo Depression. The distributions of three species, M. birimosum, M. multiflorum, and M. tuberculatum, span the Trouin Valley, since they occur both in the Massif de la Selle and Massif de la Hotte. The Cul de Sac is spanned only, and just barely, by the two most ancient species in the genus, M. acuminatum and M. amygdalinum (sect. Sagraeoides). Each is known from but a single locality on the opposite side of the Cul de Sac from the rest of its range.

Pleistocene climatic changes may have served as important phenomena shaping evolution and phytogeography in Mecranium. Pregill and Olson (1981) assembled climatic data and fossil distributions of once-widespread vertebrate xerophiles that are now relictual in distribution. They suggest that during the last glacial advance, 24,000-17,000 years ago, the climate was cooler and drier than it is presently. This previous climate, which would have limited the occurrence of moist habitats like wet forests on limestone and broad-leaved cloud forests, might have fragmented and restricted the distributions of Mecranium species. These events would have provided opportunities for isolation and intense selection, as well as for gene exchange between species that formerly occurred separately in more widespread forests. During this time period, moist refugia might have been cradles of speciation for Mecranium.

The patterns of distribution observed in Mecranium are complex and can be explained in numerous ways. Both dispersal and vicariance are probably involved. Resolution of the evolutionary relationships in the Mecranium multiflorum complex, s.l., is required to speculate further on the biogeographical relationships of the clades in Mecranium. A phylogenetic study of Sagraea clearly is needed, as are studies of other diverse Caribbean plant genera, such as Calycogonium and Wallenia.

ECOLOGY

Habitat. Mecranium is largely a genus of broad-leaved cloud forests, which sometimes occurs in situations where there is a scattered overstory of pines. Such forests are developed on oxisols (brown or red lateritic soils), usually in areas where there is some exposed limestone. The genus is also represented in lower-elevation montane hardwood forests on limestone, similar to the "wet forest on limestone" described for the Antilles by Howard (1974). Most of the taxa occur at elevations above 800 m.

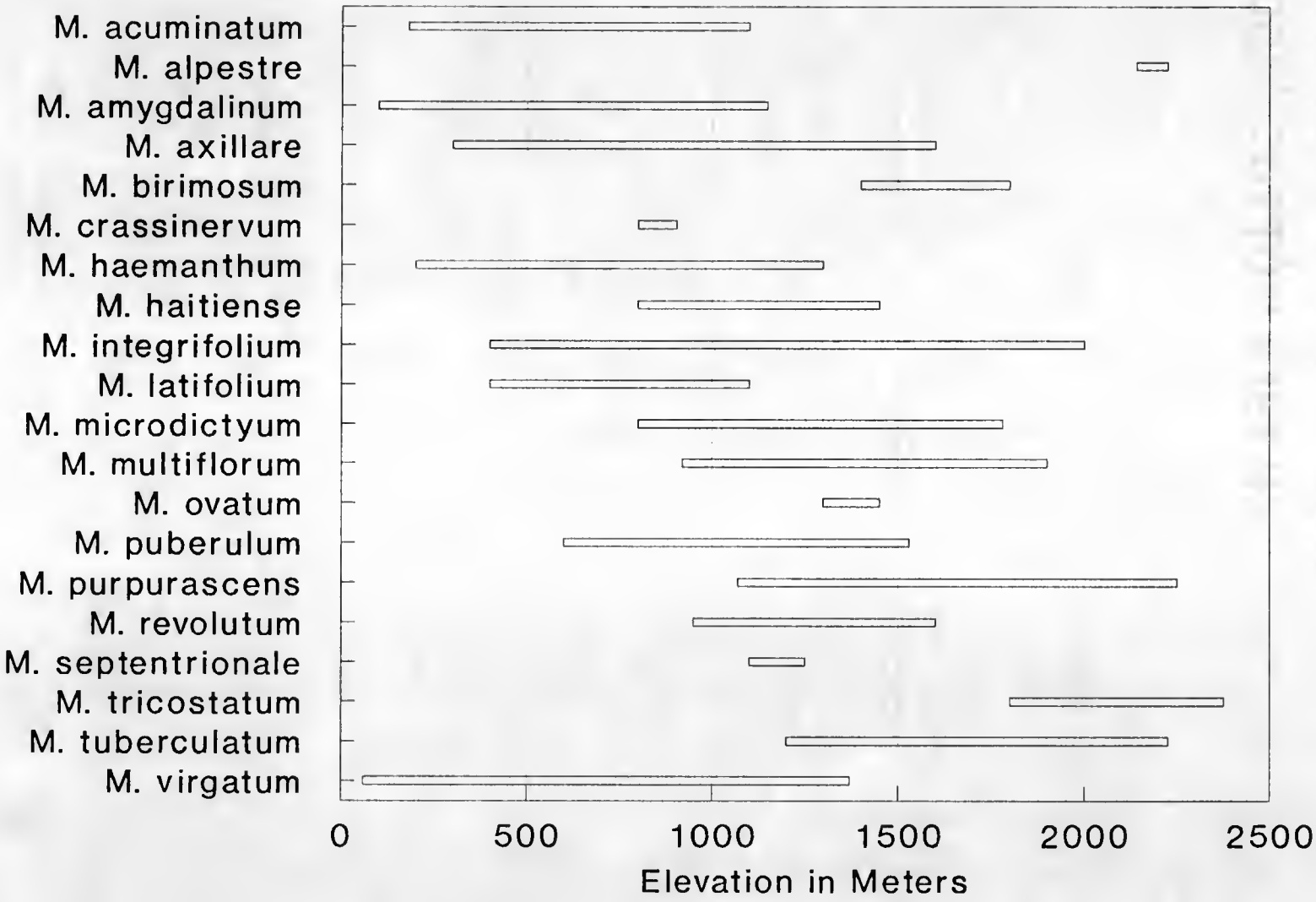
On Hispaniola, where Mecranium shows its greatest diversity, the species found at higher elevations (above 1200 m) usually occur in cloud forests dominated by trees of Didymopanax tremulum Krug & Urban, Brunellia comocladiifolia Humb. & Bonpl., and Weinmannia pinnata L., with scattered individuals of Pinus occidentalis Sw. See Judd (1987) for a discussion of these cloud forests in the national parks of Haiti, and Ciferri (1936), Zanoni (1986a), and Zanoni et al. (1984) for general information concerning the vegetation of Hispaniola. On Cuba various Mecranium species occur in similar habitats ranging from lower elevation hardwood forests on karst to the moist montane rain forests, i.e., "fangales" and mossy forests, i.e., "monte fresco" in the

highest elevations of the Sierra Maestra (Borhidi et al. 1979, Seifriz 1943, Smith 1954). One endemic subspecies, M. integrifolium subsp. alainii, is restricted largely to moist thickets, i.e., "charrascales" developed on oxisols overlying serpentine. See Alain (1953, 1958), Borhidi (1985), and Borhidi and Muñiz (1986) for general discussions of endemism in the flora of Cuba.

Jamaica and Puerto Rico harbor fewer species than do the other islands, but these species occur in similar montane habitats. On Jamaica, where native pines are absent, Mecranium species occur in moist forests on limestone, such as those on some of the higher peaks in the eastern and central portion of the island, e.g., Dolphin Head in Hanover Parish and Mt. Diablo in Saint Ann, as well as in similar, wetter forests in the foothills of the Blue and John Crown mountains, ranging to the extremely moist elfin mist forests in the highest elevations of the Blue Mountains. See Asprey and Robbins (1953), Grubb and Tanner (1976), Kelly (1986), Shreve (1914), and Tanner (1986) for discussions of the montane forests of Jamaica. On Puerto Rico, M. latifolium occurs in wet forests on limestone above 400 m as well as in the cloud forests of the island's highest peaks. See Dansereau (1966) and Gleason and Cook (1926) for general discussions of the montane forests of Puerto Rico.

Elevational range. Figure 20 illustrates the elevational distributions of the species for which these

Fig. 20. Elevational ranges for species of Mecranium, excluding M. obtusifolium, M. plicatum, and M. obtusifolium, the three species for which these data are not known.


M. acuminatum
M. alpestre
M. amygdalinum
M. axillare
M. birimosum
M. crassinervum
M. haemanthum
M. haitiense
M. integrifolium
M. latifolium
M. microdictyum
M. multiflorum
M. ovatum
M. puberulum
M. purpurascens
M. revolutum
M. septentrionale
M. tricostatum
M. tuberculatum
M. virgatum
0
500
1000
1500
2000
2500
Elevation in Meters

data are known. Species of Mecranium have been documented to occur at elevations as low as 60 m above sea level for M. virgatum in the Port Antonio region of eastern Jamaica, to as high as 2347 m, for M. tricostatum, which has been recorded from Pic Macaya in the Massif de la Hotte of Haiti. Only five species of Mecranium occur in significant numbers at elevations below 500 m. On Hispaniola, M. acuminatum and M. amygdalinum occur at nearly identical elevations and appear to have similar ecological requirements, but are not known to occur sympatrically. They are the only "weedy" species of Mecranium, being especially common in cut-over areas, abandoned agricultural fields, and along roadsides. On Jamaica, M. axillare and M. virgatum both exhibit broad ecological amplitudes in terms of elevational distribution. Mecranium virgatum, nearly limited to the eastern half of the island, occurs at elevations from 60 m to 1370 m. Mecranium axillare occurs at elevations as low as 300 m at Dolphin Head in the west (subsp. urbanianum), but may be found also in the Blue Mountains at elevations as high as 1600 m (subsp. axillare). On Cuba, M. haemanthum is widespread in riverine forest, occurring at elevations as low as 400 m in populations in the western part of the island and as high as 1300 m in the Sierra Maestra in the east. Most Mecranium species have elevational distributions that span six to eight hundred meters, although a few are narrow endemics that occur only over a one or two hundred

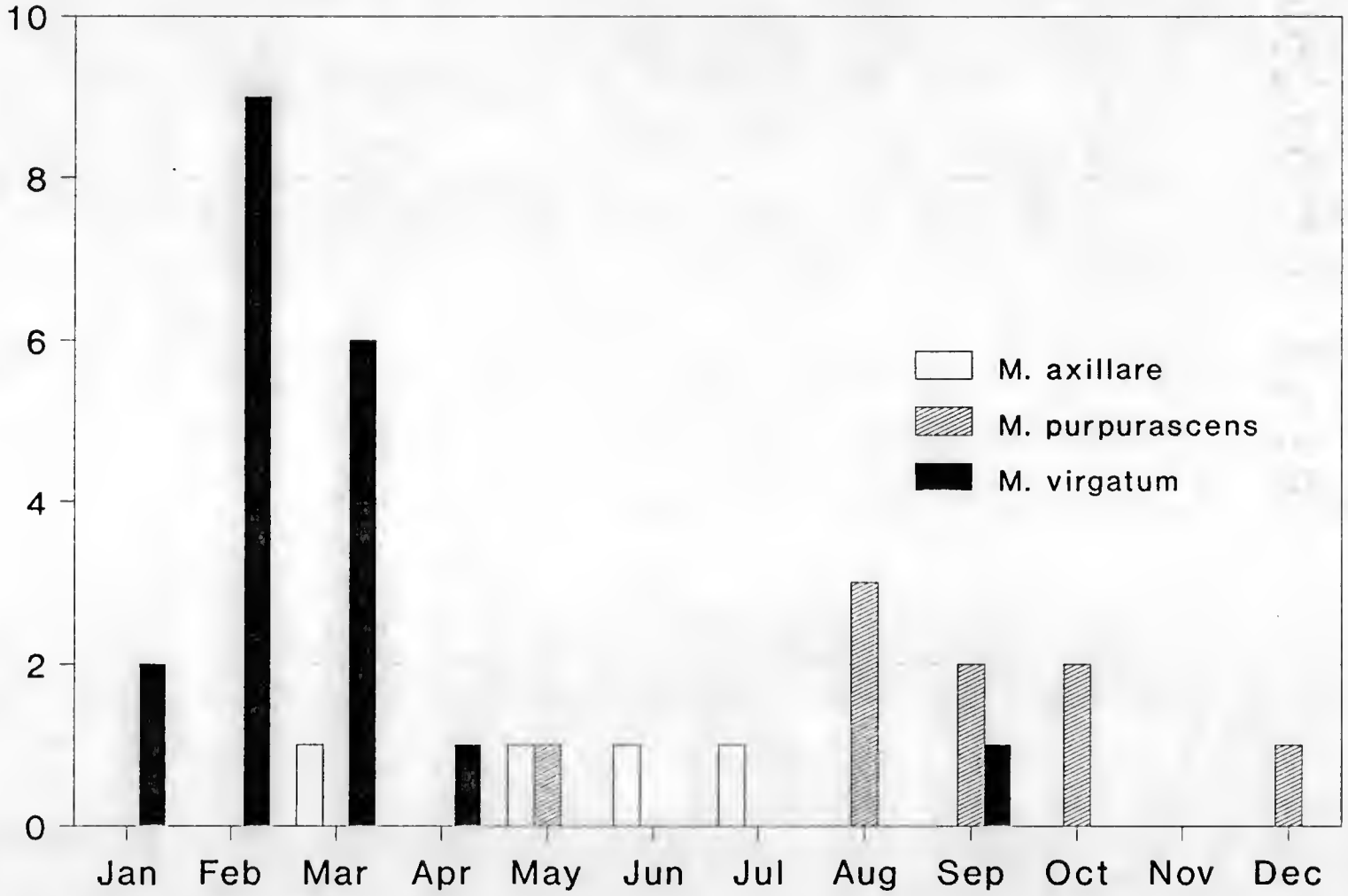
meter range (e.g., M. alpestre, M. crassinervum, M. ovatum, and M. septentrionale) (Fig. 20).

Reproductive biology. The flowers of Mecranium species are small, usually with a diameter of less than four millimeters at anthesis. Most have white corollas, although red-purple petals are uniformly found in M. crassinervum, M. haemanthum, and M. tuberculatum, and pink petals are found in M. haitiense. The petals are white or tinged basally with purple in some individuals of M. purpurascens. Mecranium flowers are actinomorphic, unscented, and appear to be rather "generalized" (Faegri and van der Pijl 1978). Pollen is apparently the only floral reward. Data on floral visitation by potential pollinators are scarce. Tanner (1982) reported in very general terms that M. purpurascens was insect pollinated, with introduced honeybees, Apis mellifera L., being very common pollinators in the region of the Blue Mountains where he observed the flowering of this species. On 18 May 1984 I observed floral visitation of hymenopterans and dipterans on M. multiflorum (Skean 1055, 1056), which was at its peak of flowering in the Massif de la Selle of Haiti. Honeybees were the most common floral visitors. In 1927 Ekman reported that bees were common visitors to the flowers of the same species at Morne Rochelois on the extreme eastern extension of the Massif de la Hotte (Ekman H7933, label on sheet at S). I have not observed any other floral visitors on Mecranium, although I have witnessed the flowering of 13 species in the field.

However, aside from M. multiflorum, only M. acuminatum and M. amygdalinum were flowering profusely at the time of my observations. Dent-Acosta (pers. comm., 21 November 1988) has been studying the reproductive biology of M. latifolium on Puerto Rico. Her work reveals that the species produces flowers for two or three months, and after all fruits ripen, begins flowering again. This cycle occurs two or three times in a single year. Flowering in Mecranium is apparently not the "big-bang" event like that documented for Miconia minutiflora (Bonpl.) DC. by Mori and Pilpoly (1984).

Where species occur sympatrically, reproductive isolation may be promoted by differences in flowering time. For example, three species of Mecranium occur in the Blue Mountains of Jamaica. Here M. virgatum is found at elevations of 200-1370 m, M. purpurascens at elevations of 1070-2250 m, and M. axillare subsp. axillare at elevations of 1070-1600 m. The species are largely allopatric, but can be found together at several localities, including Hardwar Gap, above Newcastle, and in the vicinity of Portland Gap below Blue Mountain Peak. Although data are scarce, when the dates of collection of all the flowering specimens of these taxa from the Blue Mountains are examined, it appears that the flowering "peaks" occur at different times. Figure 21 illustrates the months of collection for 32 flowering specimens of Mecranium species gathered in the Blue Mountains of Jamaica. With some overlap between species, Mecranium virgatum flowers primarily in February and March,

Fig. 21. Month of collection for the 32 flowering collections of Mecranium axillare, M. purpurascens, and M. virgatum examined from the Blue Mountains of Jamaica.


10
8
6
4
2
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
M. axillare
M. purpurascens
M. virgatum

M. axillare flowers from March through July, and M. purpurascens flowers primarily from August through October. A similar situation of phenological separation occurs in the Massif de la Selle of Haiti, where M. multiflorum, which flowers from April to June, and M. birimosum, which flowers from September to March, are sympatric at elevations of 1500-1800 m.

In Mecranium hybridization is a rare consequence of sympatry and similar phenology. In the Massif de la Hotte of Haiti, M. haitiense and M. revolutum are sympatric in the "rak bwa," i.e., hardwood forests on karst, in the vicinity of Morne Formon. Both of these species are known to flower in early June. Reproductive isolation is apparently not complete, as a putative hybrid between these taxa was collected (Skean 2093). No other example of hybridization has been reported for the genus.

A period of several months typically follows from anthesis to maturity of the fruits, which are many-seeded, blue-black berries. The fruits are presumably bird-dispersed, although no first-hand accounts of dispersal have been reported in the literature. At Dolphin Head, Hanover Parish, Jamaica, I was told by a local resident, Asley Samuels, that the fruits of the local taxon (M. axillare subsp. urbanianum) were consumed in great quantities by a bird called the "Shine-eye Hopping Dick," presumably either Turdus jamaicensis Gmelin or T. aurantius Gmelin. Dent-

Acosta (pers. comm.) has seen vireos and migratory warblers feeding on the fruits of M. latifolium.

TAXONOMY

Mecranium J. D. Hook. in Bentham & J. D. Hook., Gen. Pl.: 767. 1867.--LECTOTYPE, HERE DESIGNATED: Mecranium virgatum (Sw.) Triana.

Ekmaniocharis Urban, Ark. Bot. 17 (7): 48. 1921.--TYPE: Ekmaniocharis crassinervis Urban.

Evergreen shrubs or small trees with pleonanthic shoots (Rauh's Model) and gray-brown smooth or longitudinally furrowed bark. Twigs slightly to moderately 4-angled (strongly 4-angled and ridged in M. haemanthum and M. tuberculatum), green or red-purple, nodose, smooth or minutely tuberculate-roughened, essentially glabrous to densely pubescent, with a minute ridge (to 0.2 mm thick) encircling each node (or, in M. crassinervum, each node with a flange-like outgrowth) and 2 longitudinal grooves (to 0.5 mm wide) on opposite faces of internode positioned 90° from adjacent upper node. Indumentum of minute, obconical to ± cylindrical, thin-walled, multicellular glandular hairs, to ca 0.1 mm long, and unbranched to irregularly branched and matted, multicellular hairs, to ca 1 mm long (nearly dendritic-stellate in M. plicatum), in most species restricted to youngest buds, leaf axils, and

nodal ridges, less commonly in internodal grooves or evenly distributed on young twigs. Buds narrowly ovoid, sylleptic, essentially glabrous to densely pubescent. Leaves opposite, decussate, petiolate, estipulate, chartaceous or coriaceous, ± plane, slightly to strongly curved abaxially, or plicate, those on young shoots often tinged with red-purple on veins and margins if growing in areas of high sunlight (± entirely purple in some leaves of M. haitiense); adaxial surface often essentially glabrous or with some minute glandular hairs or larger hairs similar to those on stem persisting in vein impressions or at petiole junction; abaxial surface sparsely to moderately pubescent with minute glandular hairs and sometimes also sparsely to moderately pubescent with larger hairs similar to those on stem, these often caducous or persisting in axillary tufts at junction of midvein and largest secondary veins; marsupiform domatia often located in axils of junction of midvein and 2 largest secondary veins; margin usually serrate in distal ca 3/4 of lamina to nearly entire, plane to strongly revolute, often more so near base where basal "pseudodomatia" may be formed from the folded leaf margin, the teeth typically with early caducous, acicular, multicellular, apically-curved projections to 0.5 mm long (to 1.5 mm long in M. crassinervum); venation acrodromous, ± basal or suprabasal, with a prominent midvein, 1-3 pairs of secondary veins (1 of these usually intramarginal and inconspicuous), numerous percurrent tertiary veins more or less perpendicular to midvein and

convex, and reticulate quaternary and higher order veinlets; petiole canaliculate, green or red-purple, glabrous to densely pubescent with hairs similar to those on stem. Inflorescences axillary, paniculate cymes borne in the leaf axils and/or on leafless nodes below the leaves, usually borne singly, but in robust shoots sometimes branched at base and appearing to have 1-3 per axil, 1-2 (4) branched, bracteate, with opposite, narrowly triangular bracts (the 2 lowest protecting inflorescence bud and early caducous). Flowers perfect, 4-merous, sessile (in M. virgatum appearing pedicellate due to prolonged hypanthium base), lacking fragrance. Hypanthium green to tinged heavily with red-purple, subglobose, ± cylindrical, or slightly obconical, essentially glabrous to moderately pubescent with hairs similar to those on stem. External calyx lobes 4 small teeth less than 0.5 mm long at anthesis. Internal calyx lobes free and imbricate (sect. Sagraeoides) or fused in a conspicuous, dome-like (± conical in M. racemosum) apiculate, calyptra (sect. Mecranium), which is pushed aside or ruptures irregularly as style elongates at anthesis. Petals 4, white, sometimes tinged with yellow-green or pink at base, to red-purple, usually obovate, with rounded, retuse apices (sect. Mecranium), or broadly obovate to ovate or narrowly triangular (sect. Sagraeoides), glabrous, many-veined (except 1-veined in M. acuminatum), spreading or, less commonly, reflexed. Stamens 8, ± isomorphic, white, or red-purple with white anther sacs, glabrous, inserted above

an erose-ciliate androecial fringe located just internal to the point of filament attachment, i.e., on the torus of the hypanthium, geniculate, folded adaxially in bud; proximal segment (filament) narrowly ovate or narrowly obovate, flattened dorsally, strongly curved; distal segment (anther sacs and connective) narrowly obovate or narrowly ovate, the anther sacs often slightly inrolled adaxially, the connective often prolonged beyond bases of anther sacs, the 2 anther sacs dehiscing confluently by means of a single small apical pore, or opening by means of a single gaping, dorso-apical, 2-chambered foramen formed from 2 lateral slits, with the septum torn, or opening separately by 2 apical pore-like slits that extend down the sides and often to the adaxial surface of the anther, with the septum between the anther sacs intact; pollen tricolporate, with 3 additional pseudocolpi, ellipsoid, obscurely rugulate. Ovary ± inferior (ca 1/2 inferior in sect. Sagraeoides), 4-locular, with axile placentation, ovules numerous, anatropous, the apex prolonged into a collar-like, 8-ribbed appendage, which encases the folded distal stamen segments in bud and encircles the style. Style white, or rarely light purple, cylindrical or very slightly obconical, straight or very strongly curved; stigma papillose, capitate, or less commonly not expanded. Berries deep purple-black, essentially glabrous or with minute glandular hairs. Seeds narrowly ovoid, papillose, tan. Testa 1 cell layer thick, each cell sinuous-margined, flattened, or more

commonly, comprising a single papilla. Embryo occupying nearly entire seed, with 2 fleshy cotyledons, endosperm absent. Germination epigeal. n = 12, 17.

Key to the Species of Mecranium

This key is intended for use with a stereomicroscope having at least 20x magnification and an ocular micrometer for observing minute details of stems, leaves, and flowers. The identification of some species requires careful measurement of petals and anthers, which should be taken from dried herbarium specimens boiled in 50% EtOH prior to study. One rare species for which flowers are unknown is excluded: M. plicatum, a taxon endemic to the Massif de la Hotte of Haiti having twigs sparsely to moderately pubescent with golden-brown, irregularly branched to nearly dendritic-stellate multicellular hairs (Fig. 55). See Appendices A-C for regional keys to the species of Hispaniola, Cuba, and Jamaica, respectively.

1. Internal calyx lobes, free, imbricate, calyptra absent; petals obovate, ovate, or narrowly triangular, lacking a distinct apical notch; ovary ca 1/2 inferior; marsupiform domatia present on leaf abaxial surface at junction of midvein and largest 2° veins.

   I. sect. Sagraeoides.

2. Petals obovate or ovate, usually appearing ovate due to involute margin, 1.6-2.1 mm wide, with several major longitudinal veins, apices obtuse.

1. M. amygdalinum.

2. Petals narrowly triangular, 0.4-0.9 mm wide, each with a single major longitudinal vein, apices acuminate.

2. M. acuminatum.

1. Internal calyx lobes fused in a dome-like or conical calyptra; petals obovate, rounded, each with a distinct apical notch where imbricate in bud; ovary ± inferior; marsupiform domatia absent or present.

II. sect. Mecranium.

3. Conspicuous collar-like flanges, 1-3 mm wide, encircling nodes of twigs; petals red-purple.

4. M. crassinervum.

3. Conspicuous nodal flanges absent, twigs encircled by minute ridges at nodes; petals white to red-purple.

4. Leaves of fertile shoots with blades consistently less than 4 cm long; petioles 2-8 mm long.

5. Young twigs and petioles densely pubescent with unbranched to irregularly branched and matted multicellular hairs; abaxial lamina surface pubescent with similar hairs concentrated in axillary tufts at junction of midvein and

largest 2° veins and at lamina base; smallest veinlets flat or raised abaxially; lamina bases with margins flat or revolute and forming basal pseudodomatia. 10. M. alpestre.

5. Young twigs and petioles essentially glabrous or with hairs lining internodal grooves; abaxial lamina surface essentially glabrous; smallest veinlets raised abaxially; lamina bases with margins nearly always revolute, forming basal pseudodomatia. 9. M. tricostatum.

4. Leaves of fertile shoots with some to all blades greater than 4 cm long; petioles 3-41 mm long.

6. Inflorescences borne ± exclusively on leafless nodes below the leaves and on old wood.

7. Twigs strongly 4-angled and longitudinally ridged, roughened with bases of caducous multicellular hairs; petals and stamens red-purple; hypanthium base rounded, lacking a prolonged basal portion; anthers opening by 2 pore-like slits, anther sacs 0.9-1.3 mm long, the septum between them intact.

8. Leaf apex acuminate or acute, lamina 2-3.5x as long as wide, the midvein, 2° veins, and 3° veins usually flat or slightly impressed adaxially; Cuba. 20. M. haemanthum.

8. Leaf apex short-acuminate, obtuse, or rounded, lamina 1-2x as long as wide, the midvein, 2° veins, and 3° veins usually slightly to strongly impressed adaxially; E. Cuba and Hispaniola.

21. M. tuberculatum.

7. Twigs slightly to moderately 4-angled, lacking longitudinal ridges, smooth, not roughened; petals and stamens white; hypanthium base prolonged and flower appearing pedicellate; anthers opening by a single gaping foramen, anther sacs 1.1-1.8 mm long, the septum between them torn; Jamaica.

8. M. virgatum.

6. Inflorescences borne in leaf axils and on leafless nodes just below the leaves.

9. Young twigs moderately to densely pubescent with unbranched to irregularly branched and matted multicellular hairs scattered on the twigs, sometimes concentrated in internodal grooves, but not limited to these grooves.

10. Leaves with 5 major longitudinal veins visible on adaxial surface, the midvein, 2° veins and 3° veins impressed in living material, flattening upon drying, but still visible as slight impressions; twigs densely pubescent; anthers narrowly

obovate, opening by 2 pore-like slits, the septum between the anther sacs intact; anther sacs 0.3-0.5 mm long.

19. M. puberulum.

10. Leaves with 3 major longitudinal veins visible on adaxial surface, the midvein, 2° veins, and 3° veins flat, not impressed; twigs slightly to moderately pubescent; anthers narrowly ovate, opening by a single small apical pore; anther sacs ca 1.2 mm long.

3. M. racemosum.

9. Young twigs essentially glabrous or with hairs limited to 2 internodal grooves, not scattered on twigs.

11. Anthers narrowly ovate or very slightly obovate, opening by a single small apical pore; twigs essentially glabrous; petals white to pink.

12. Petals pink, anthers narrowly ovate, anther sacs 1.7-2 mm long; leaves ovate, less commonly elliptic, often nearly uniformly red-purple; Haiti.

5. M. haitiense.

12. Petals white or tinged basally with pink, anthers elliptic or slightly obovate, anther sacs 1.3-2.2 mm long;

leaves obovate or elliptic, less commonly narrowly ovate, often green tinged with red-purple; Jamaica.

6. M. purpurascens.

11. Anthers narrowly obovate, opening by 2 pore-like slits, the septum between the anther sacs intact, or opening by a single gaping foramen, the septum between the anther sacs torn; twigs glabrous or with hairs lining internodal grooves; petals white.

13. Marsupiform domatia present on abaxial surface of lamina in axils at junction of midvein and largest 2° veins; anthers opening by 2 pore-like slits, the septum intact.

14. Lamina coriaceous, narrowly ovate or elliptic, non-plicate, base cuneate or slightly decurrent; non-membranous portion of calyx bearing 4 additional narrowly triangular internal projections, these 0.2-0.7 mm long and opposite external calyx lobes; petals 2.1-2.5 mm long; anther sacs 0.3-0.6 mm long; domatia not expanded.

17. M. birimosum.

14. Lamina membranaceous or coriaceous, ovate, occasionally slightly plicate, base slightly cordate or rounded; non-membranous portion of calyx lacking narrowly triangular internal projections; petals ca 1.6 mm long; anther sacs ca 1.2 mm long; domatia sometimes expanded into rounded, gall-like structures.

18. M. microdictyum.

13. Marsupiform domatia absent on abaxial surface of lamina in axils of junction of midvein and largest 2° veins, these areas glabrous or sparsely to densely pubescent with tufts of unbranched to irregularly branched and matted multicellular hairs; anthers opening by a single gaping foramen, the septum between the anther sacs torn.

15. Lamina with midvein, 2° veins, and 3° veins slightly to strongly impressed above in living material, usually flattening upon drying, but visible as slight indentations.

16. Abaxial surface of lamina with persistent axillary tufts of

hairs located at the 2 major vein junctions.

13. M. integrifolium.

16. Abaxial surface of lamina glabrous or with a few hairs located in the axils of the 2 major vein junctions, the hairs mostly caducous, thus persistent axillary tufts absent.

17. Lamina elliptic or obovate, 2-5 (6) cm long, often slightly to strongly inrolled abaxially, apex obtuse or rounded; smallest veinlets usually flat abaxially in dried material; twigs glabrous; Haiti, Massif de la Hotte.

12. M. revolutum.

17. Lamina ovate or elliptic, rarely obovate, (1.6) 2.5-10.4 (13.1) cm long, not inrolled abaxially, apex usually acuminate; smaller veinlets flat to slightly raised in dried material; twigs essentially glabrous or with

hairs concentrated in internodal grooves.

18. Abaxial leaf surface with smallest veinlets slightly raised in dried material; twigs essentially glabrous; Dominican Republic, Sierra de Baoruco.

7. M. ovatum.

18. Abaxial leaf surface with smallest veinlets flat in dried material; twigs essentially glabrous or with hairs concentrated in internodal grooves; Cuba, N. Hispaniola.

13. M. integrifolium.

15. Lamina with midvein, 2° veins, and 3° veins ± flat or very slightly impressed above in living condition, appearing flat in dried material.

19. Lamina apex obtuse; twigs glabrous; W. Cuba.

22. M. obtusifolium.

19. Lamina apex acuminate or acute; twigs glabrous or with hairs lining internodal grooves.

20. Anther sacs 0.8-1.2 mm long; twigs essentially glabrous; abaxial surface of lamina lacking persistent axillary tufts at junction of midvein and largest secondary veins; S. Hispaniola.

11. M. multiflorum.

20. Anther sacs 0.3-0.7 mm long; twigs essentially glabrous or pubescent with hairs concentrated in internodal grooves; abaxial surface of lamina glabrous or with persistent axillary tufts of hairs at junction of midvein and largest secondary veins; Hispaniola, Puerto Rico, or Jamaica.

21. Petals 2-3.4 mm long; lamina ovate, less commonly elliptic; twigs essentially glabrous; Puerto Rico.

16. M. latifolium.

21. Petals 1-2 mm long; lamina ovate, elliptic, or narrowly obovate; twigs glabrous or pubescent with hairs lining

internodal grooves; Hispaniola or Jamaica.

22. Petals 1-1.4 mm long; leaves of fertile shoots with blades usually less than 6 cm long, ovate, less commonly elliptic, abaxial surface lacking persistent axillary tufts of hairs at junctions of midvein and 2 largest 2° veins, smallest veinlets flat; twigs essentially glabrous; Dominican Republic, Cordillera Septentrional.

15. M. septentrionale.

22. Petals 1.5-2 mm long; leaves of fertile shoots with blades usually greater than 6 cm long, ovate, narrowly elliptic, or narrowly obovate; abaxial surface of lamina glabrous or with persistent axillary tufts of hairs at junctions of midvein and 2 largest 2° veins, smallest veinlets

flat or slightly raised; twigs essentially glabrous or with hairs lining internodal grooves; Jamaica.

14. M. axillare.

Mecranium section Sagraeoides

I. Mecranium section Sagraeoides Skean, sect. nov.--TYPE: Mecranium amygdalinum (Desr.) C. Wright.

Mecranio speciebus sine calyptris; ovario 1/2-3/4 inferio.

Flower buds lacking a calyptra, the internal calyx lobes free and slightly imbricate, broadly triangular, ca 0.06 x 0.25 mm, with rounded apices. Petals broadly obovate to ovate or narrowly triangular, the apices rounded or long acuminate, without a distinct apical notch. Ovary 1/2 to 3/4 inferior. Leaves with marsupiform domatia on abaxial surface in axils of junction of midvein and two largest secondary veins; usually plicate.

1. Mecranium amygdalinum (Desr.) C. Wright in Sauvalle, Anales Acad. Ci. Med. Habana 5: 435. 1869. Melastoma amygdalina Desr. in Lam. & Poiret, Encycl. 4: 35. 1797. Ossaea amygdalina (Desr.) DC., Prod. 3: 169. 1828. Cremanium amygdalinum (Desr.) Griseb., Fl. Br. W. I. 261. 1860.--TYPE: SAINT DOMINGUE [HISPANIOLA]. Without specific locality [probably Haiti, Massif de la Selle], fl, without date [1789], Martin s.n. (holotype: P, not seen; isotype: P!).

Shrub or small tree to ca 3.5 m tall. Twigs slightly to moderately 4-angled, 1-2 mm in diameter, smooth,

essentially glabrous or youngest portions with scattered light brown globular to irregularly branched hairs, especially on nodal ridges; internodes 0.8-1.8(3) cm long. Leaf blade membranaceous or coriaceous, narrowly ovate, 3.9-11.2 cm long, 1.1-2.3 cm wide, often red-tinged and plicate if plant in full sun; apex acuminate; base obtuse or acute to slightly decurrent; margin plane or often revolute near base, usually conspicuously serrate in distal ca 4/5; venation usually suprabasal, with 1 pair of conspicuous secondary veins joining midvein 0.5-9 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat or not visible; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins flat, the surface essentially glabrous, but with some scattered minute, glandular hairs; marsupiform domatia present on abaxial surface in axils at junction of midvein and largest secondary veins, persistent axillary hair tufts absent. Petiole 4-19 mm long, pubescent with hairs similar to those on stem. Inflorescences borne in leaf axils and on leafless nodes below leaves, 1.2-3 cm long, 0.4-2.8 cm wide, 1-2 branched, the caducous bracts to ca 1 mm long; peduncle 2-12 mm long. Hypanthium slightly obconical, 1.8-3 mm long, 1.4-1.8 mm wide, very sparsely pubescent with minute

glandular hairs, the portion free from ovary 0.6-1.25 mm long; portion of calyx bearing external teeth 0.2-0.4 mm long. Calyx teeth 0.2-0.4 mm long, ca 0.2 mm wide. Calyptra absent. Petals white, ovate or obovate, usually appearing ovate due to involute margin, 2.5-3.8 mm long, 1.6-2.1 mm wide, many-veined, strongly reflexed; apex obtuse, emarginate. Stamens white; proximal segment narrowly obovate, 1.2-2.1 mm long, 0.4-0.5 mm wide; distal segment narrowly ovate, 1.6-2.2 mm long, 0.4-0.6 mm wide, the anther sacs 1.3-2 mm long, opening by a single small apical pore. Ovary 1/2-2/3 inferior, 1.2-1.9 mm long, 1-1.4 mm wide, the apical appendage 0.5-0.8 mm high; style white, strongly curved, 3.9-6.7 mm long, 0.4-0.7 mm wide; stigma 0.2-0.7 mm wide, not expanded. Berries ca 5 x 5 mm, purple-black, glabrous or with a few minute glandular hairs, apical ovary appendage often prolonged beyond body of fruit; seeds ca 0.5 x 0.3 mm. Figs. 22, 23A.

Phenology. This species is known to be flowering or fruiting from February to September.

Distribution and Habitat. Hispaniola (Fig. 24): primarily a "south island" species limited to the Massif de la Selle of Haiti. Two extremely low-elevation collections are known from north of the Cul de Sac-Enriquillo Depression in ruderal areas around Santo Domingo in the Dominican Republic. Mecranium amygdalinum, and the closely related M. acuminatum, are perhaps the "weediest" species in the genus. Mecranium amygdalinum occurs in open, disturbed, sunny

Fig. 22. Mecranium amygdalinum (Skean 2009 unless otherwise indicated). A. Habit. B. Leaf, abaxial surface (Skean 1629). C. Flower bud just before anthesis (Skean 1629). D. Petal. E. Flower. F. Fruit.

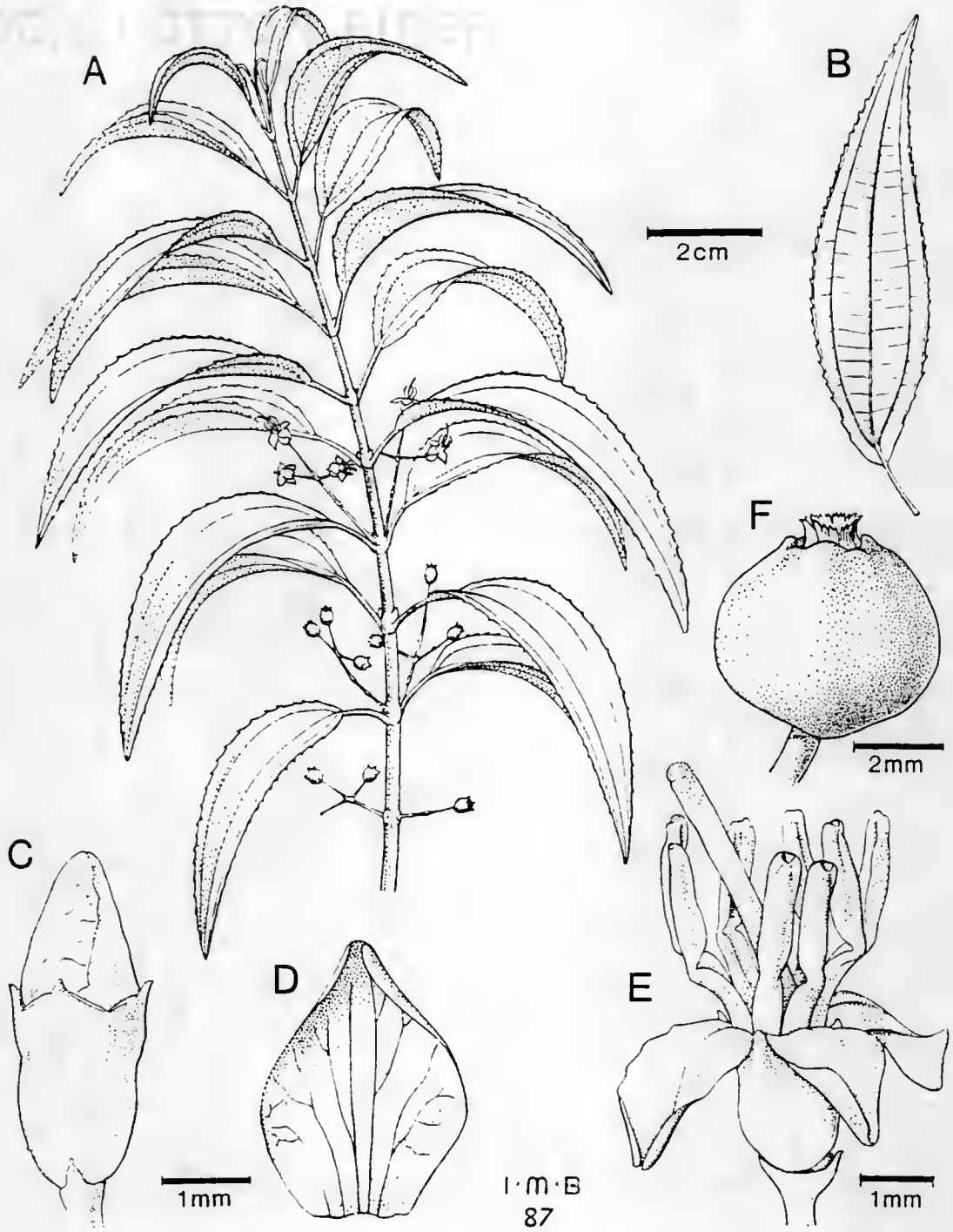
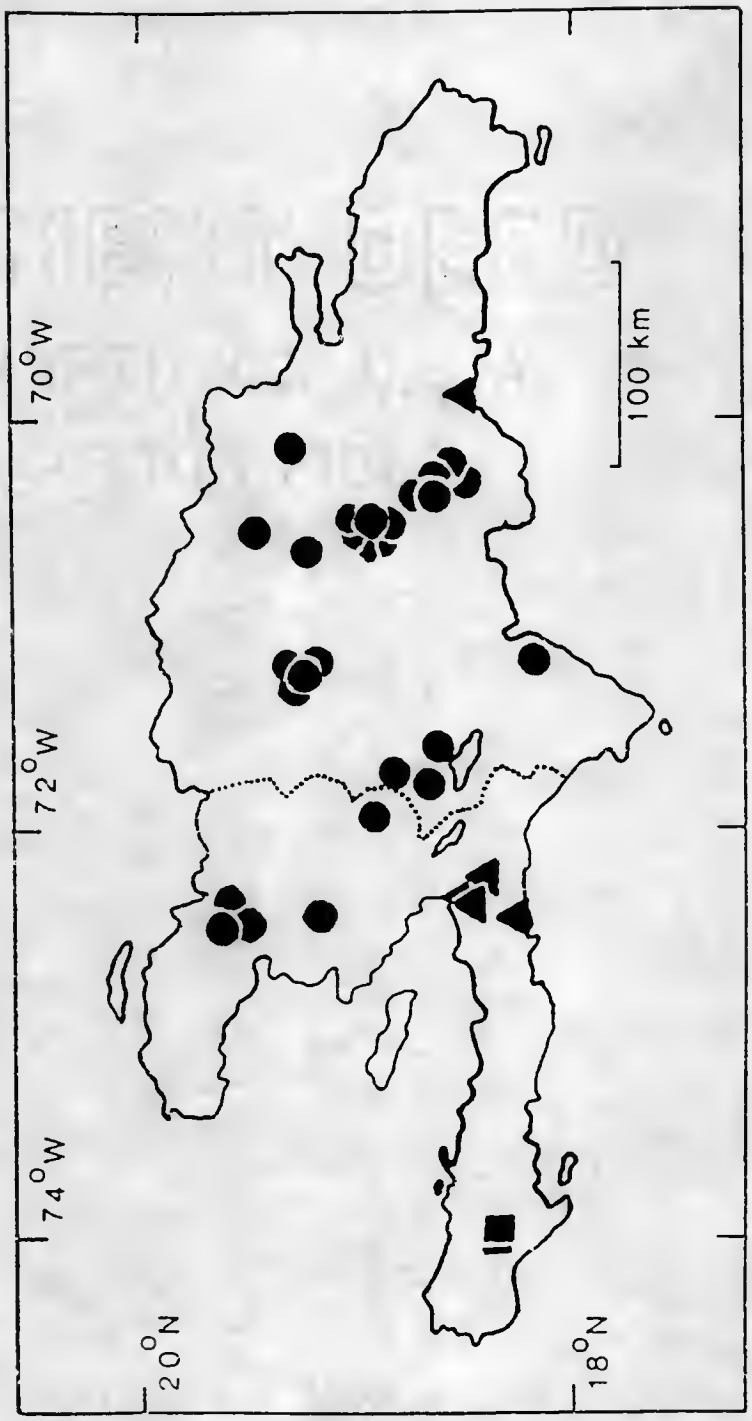

A
B
2cm
F
2mm
C
D
E
1mm
1mm
I·M·B
87

Fig. 23. Photographs of M. amygdalinum and M. multiflorum in the Massif de la Selle of Haiti. A. M. amygdalinum habit (ca 1.3x), from Skean 2009. B. M. multiflorum habit (ca 0.75x), from Skean 1056.

A
B

Fig. 24. Distribution of Mecranium amygdalinum (triangles), M. acuminatum (circles), and M. crassinervum (squares).


70°W
72°W
74°W
20°N
18°N
100 km

areas; 100-1150 m. It is most common in disturbed low elevation montane forest at elevations of 500-900 m.

ADDITIONAL SPECIMENS EXAMINED. DOMINICAN REPUBLIC. Cordillera Central: El Namielito, erruptive hills, ca 100 m, Ekman H14280 (S); Villa Mella, Lavastre 2095 (JBSD). HAITI. Massif de la Selle: mountains at Jacmel, 400 m, Buch 1192 (GH, IJ, US); Pétionville, Furcy, at Riv. Pénaud, ca 1000 m, Ekman H1898 (A, G, IJ, NY, S, US); Port-au-Prince, Morne l'Hopital, 800 m, Ekman H8183 (EHH, GH, NY, S, US); Morne Boutellier, SE of Port-au-Prince, ca 3000 ft [915 m], Proctor 10654 (IJ, US); Morne Cavalier, 505 m, Skean 1629 (A, FLAS, JBSD, NY, S, US); Morne Boutilliers, 0.4 km W of transmission towers, 900 m, Skean 2009 (A, BM, BR, DUKE, E, F, FLAS, G, GOET, IJ, JBSD, JE, L, M, MO, NY, P, S, UC, UCWI, US); Montagne Noir, between Port-au-Prince and Fort Jacques, ca 1150 m, Skean 2127 (A, FLAS, IJ, JBSD, NY, S, US); Morne l'Hopital, Rue Boullier, 750-860 m, Zanoni & Mejia 26216 (FLAS). WITHOUT LOCALITY: [probably Haiti, Massif de la Selle], Anon. (G); [1796-1801, label says 1802], Poiteau s.n. (G).

Traditionally, most authors have considered Mecranium amydgalinum to represent an extremely variable species found on all four Greater Antillean Islands. This misapplication of the name was an unfortunate error. Careful study of the original description and type material has revealed that M. amygdalinum is actually a Hispaniolan endemic closely

related to the species formerly known as Ossaea acuminata DC., here treated as M. acuminatum. In contrast, the widespread polymorphic species complex, treated by most authors as M. amygdalinum, is here treated as six different species, which, if lumped together, would correctly be called M. multiflorum (Desr.) Triana. Figure 23 shows photographs of these two species. Note that the photographs are at different scales; the leaves of M. amygdalinum are actually smaller than those of M. multiflorum.

In 1789 Joseph Martin, a Paris-trained plantsman, then director of the Botanical Garden in French Guiana, gathered specimens that were later named by Desrousseaux (1797) as Melastoma multiflora and Melastoma amygdalina (see Jiménez 1985, Moscoso 1943). Both species may have been collected in the Massif de la Selle-Sierra de Baoruco, most likely on an excursion in the Massif de la Selle near Port-au-Prince, Haiti, on a routine stopover in this important French colonial settlement. Though the Massif de la Selle is extremely deforested today, it is the only place where the taxa are relatively common, and they occur in the same area only here, although they are somewhat isolated elevationally, with M. multiflorum (Fig. 23B) usually found at higher elevations.

The holotype of Melastoma amygdalina (Mecranium amygdalinum) could not be located at Paris (S. Barrier, pers. comm., 5 Jun 1987), but a sheet labeled "isotype" was found. Upon close observation, the leaves of this species

are easily separable from those of Mecranium multiflorum because, unlike M. multiflorum, they bear marsupiform mite domatia on the abaxial surface at the junction of the midvein and the two major secondary veins (see Fig. 25C). The same structures are found also on leaves of the extremely similar and closely related Mecranium acuminatum, which together with M. amygdalinum comprises sect. Sagraeoides.

Desrousseaux (1797) described Melastoma multiflora as a glabrous species with many 4-merous flowers having rounded petals. His next entry for Lamarck's "Encylopédie," was a description of Melastoma amygdalina, which compared it with the preceding species. According to Desrousseaux, the "melastome with leaves like almond" was similar to M. multiflorum, but had more nodose stems, complinate, red-tinged, smaller leaves, and 5-merous flowers that were fewer in number. This description is almost an exact comparative diagnosis of what is treated here as Mecranium amygdalinum (Fig. 23A), but was undoubtedly prepared without close examination of the flowers. Mecranium amygdalinum has leaves that are smaller generally than those of M. multiflorum (1.1-2.3 vs. 1.3-3.4 mm wide), which, especially in exposed areas under high sunlight, are unlike those of M. multiflorum because they are often strongly plicate. Under these conditions they are also more heavily red-tinged, and are borne on more nodose stems. Mecranium amygdalinum also has smaller inflorescences than M. multiflorum (1.2-3 vs.

1.6-4.4 cm long), and the plants are generally fewer-flowered. The only discrepancy in Desrousseuax's description concerns floral merosity; Mecranium amygdalinum has 4-merous, not 5-merous, flowers. This is easily dismissed as a simple misobservation, since no true axillary-flowered, 5-merous melastomes are known from the West Indies. This error, along with the presence of 5-merous species in the genus Cremanium D. Don, were picked up in the literature by Hooker (1867) in his circumscription of the genus Mecranium. Erroneous reports of 5-merous species in Mecranium have been perpetuated by Cogniaux (1891) and some more recent workers (e.g. Alain 1957, Fawcett & Rendle 1926).

When the flowers are examined closely it is easy to observe floral differences between M. amygdalinum and M. multiflorum. Most conspicuously, the flower buds of M. amygdalinum have free and imbricate internal calyx lobes, while those of M. multiflorum are calyptrate. These and other differences have resulted in the placement of the species in two different sections, Sagraeoides and Mecranium, respectively (see discussion under Phylogeny). Though not a character delimiting sections in the genus, M. multiflorum and related species have distal stamen segments that are narrowly obovate and that bear relatively reduced anther sacs (see Figs. 39E, 39G). On the other hand, Mecranium amygdalinum and M. acuminatum have primitive "sagraeoid" anthers with the anthers sacs occupying nearly

all of the narrowly ovate or oblong distal stamen segments (Figs. 22E, 25I).

The major problem in the typification of Mecranium amygdalinum is the similarity of this species to M. acuminatum. The two taxa are differentiated only by petal characters, and thus cannot be distinguished vegetatively. Mecranium amygdalinum has relatively broad (1.6-2.1 mm wide), many-veined, ovate or obovate petals, with blunt apices, which appear ovate with their inrolled margins (Fig. 22D), while M. acuminatum has narrow (0.4-0.9 mm wide), single-veined, narrowly triangular petals with sharp apices unlike any other member of the genus (Fig. 25G-H). The unique petals of M. acuminatum undoubtedly explain the previous placement of this taxon in the genus Ossaea. Unfortunately, no petals were observed on the isotype of M. amygdalina, but it is highly unlikely that this collection represents the unique and strikingly narrow-petaled M. acuminatum, since Desrousseaux wrote that the flowers were "like the previous species," i.e., like Melastoma multiflorum (Mecranium multiflorum). Furthermore the collection probably comes from the Massif de la Selle, where M. acuminatum is not known to occur.

The similar species, M. amygdalinum and M. acuminatum, show a rather strong geographical separation (Fig. 24). Mecranium amygdalinum is primarily a "south island" plant, nearly endemic to the Massif de la Selle, but known north of the Cul de Sac from two collections (Ekman H124280, Lavastre

2095) in heavily disturbed areas near Santo Domingo where it is perhaps a recent immigrant. On the other hand, M. acuminatum is widespread on the "north island," but is known south of the Cul de Sac in the Sierra de Baoruco from only one collection (Howard 12073). Though there is a slight overlap in the geographical distributions of these two species, they are not known to occur together and no overlap in petal width has been observed.

Ekman (1930) reported the presence of M. amygdalinum on Ile de la Gonave, off the coast of Haiti. I have seen no specimen of Mecranium from this satellite island, however, if the genus is represented there, the low elevations and location of the island suggest that M. amygdalinum would be the species.

Mecranium amygdalinum has also been confused with M. plicatum Urban, a more pubescent species with much broader leaves that is known only from the type collection (in immature fruit), which was made in the Massif de la Hotte (see Fig. 56).

2. Mecranium acuminatum (DC.) Skean, comb. nov., Ossaea acuminata DC., Prod. 3: 169. 1828.--TYPE: SAINT DOMINGUE [HISPANIOLA]. Without specific locality, fl, sent by Balbis, 1821 [collected 1819-1820], Bertero s.n. (holotype: G, IDC microfiche 2562!; isotypes: F (photo!), M!, S!).

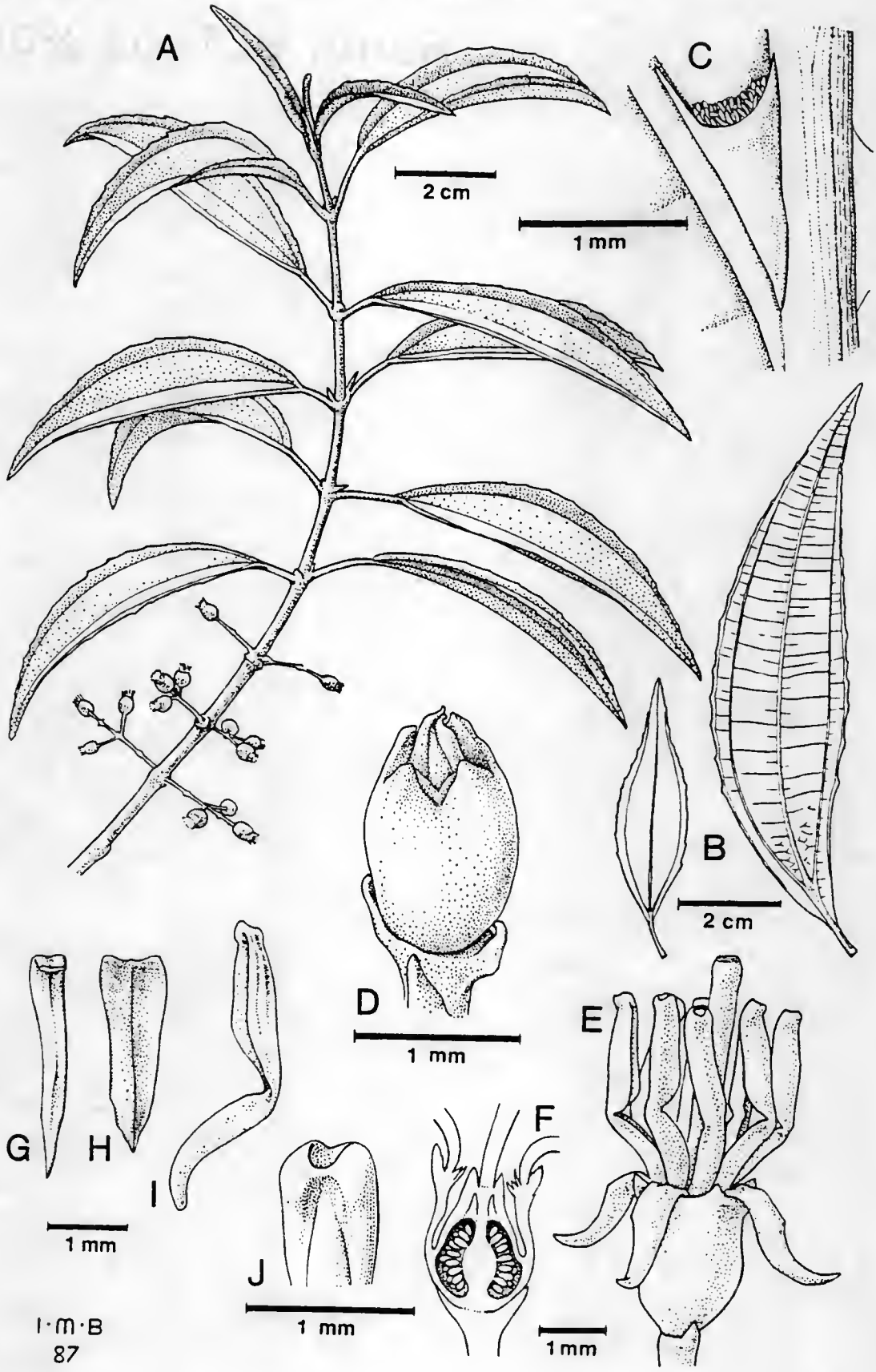
Shrub or small tree to ca 3 m tall. Twigs slightly to moderately 4-angled, 1-2 mm in diameter, smooth, essentially glabrous or youngest portions with scattered light brown globular to irregularly branched hairs, especially on nodal ridges; internodes 0.8-2.8 cm long. Leaf blade membranaceous or coriaceous, narrowly ovate, (2.2)3.7-8.9(12.2) cm long, 0.8-2.7 cm wide often red-tinged and plicate if plant in full sun; apex acuminate; base cuneate or slightly decurrent, less commonly acute or obtuse; margin plane or often slightly revolute near base, usually conspicuously serrate in distal ca 3/4; venation suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 1-6(9) mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat or not visible; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins flat, the surface essentially glabrous, but with some scattered minute, glandular hairs; marsupiform domatia present on abaxial surface in axils at junction of midvein and largest secondary veins, often with minute glandular hairs at entrance, persistent axillary hair tufts absent. Petiole 4-14 (17) mm long, pubescent with hairs similar to those on stem. Inflorescences borne in leaf axils and on

leafless nodes below leaves, (0.7) 1-2.5 (2.9) cm long, (0.3) 0.6-1.6 (2.1) cm wide, 1-2 branched, the caducous bracts to ca 1.7 mm long; peduncle 2-10 (14) mm long. Hypanthium slightly obconical, 1.8-2.6 mm long, 1.3-1.8 mm wide, sparsely pubescent with minute glandular hairs, the portion free from ovary 0.5-1.3 mm long; portion of calyx bearing external teeth 0.2-0.3 mm long. Calyx teeth 0.2-0.4 x 0.2-0.4 mm. Calyptra absent. Petals white, narrowly triangular, 1.9-3.1 mm long, 0.4-0.9 mm wide, strongly reflexed, with 1 major vein; apex sharp-pointed, sometimes with a single marginal tooth. Stamens white; proximal segment narrowly obovate, 1.2-1.8 mm long, 0.4-0.5 mm wide; distal segment narrowly ovate, 1.5-2.1 mm long, 0.4-0.6 mm wide, the anther sacs 1.4-2 mm long, opening confluently by a single small apical pore. Ovary 1/2-2/3 inferior, 1.3-2 mm long, 1.1-1.5 mm wide, the apical appendage 0.4-1.1 mm high; style white, strongly curved, 3.3-5.5 mm long, 0.3-0.5 mm wide; stigma 0.3-0.4 mm wide, not expanded. Berries ca 5 x 5 mm, purple-black, glabrous or with a few minute glandular hairs; seeds ca 0.5 x 0.3 mm. Fig. 25.

Phenology. Flowering and fruiting sporadically throughout the year, with peak flowering occurring from April to July.

Distribution and Habitat. Hispaniola (Fig. 24): essentially a "north island" plant, found in the mountains north of the Cul de Sac-Enriquillo Depression. One population is known from the Sierra de Baoruco. Mecranium

Fig. 25. Mecranium acuminatum. A. Habit (Skean 1796). B. Leaves: adaxial view (Skean 1758), abaxial view (Howard 12073). C. Leaf, close-up of abaxial surface near base showing marsupiform domatium (Skean 1758). D. Flower bud (Skean 1757). E. Flower (Skean 1819). F. Flower, longitudinal section, semidiagramatic; note androecial fringe and ca 1/2-inferior ovary (Skean 1819. G. Petal, abaxial view (Skean 1757). H. Petal, adaxial view (Skean 1819). I. Stamen (Skean 1819). J. Anther apex (Skean 1819).


A
2 cm
C
1 mm
B
2 cm
D
1 mm
E
G
H
I
1 mm
J
1 mm
F
1 mm
I·M·B
87

acuminatum is a "weedy" species of disturbed montane areas in low to high-elevation broad-leaved hardwood and pine forests; 180-1100 m, found most commonly at elevations of 400-800 m.

ADDITIONAL SPECIMENS EXAMINED. DOMINICAN REPUBLIC. Cordillera Central: Jarabacoa, Augusto 937 (JBSD); Jimenoa, Augusto 1576 (JBSD); Cerro de Higua, 20 Jul 1938, Canela s.n. (JBSD); Manacla, 12 Nov 1938, Canela s.n. (JBSD); Sebana de San Diego, San Francisco de Marcoris, 2 Apr 1943, Canela s.n. (JBSD); El Rubio to Laguna, 25 Nov 1940, Canela s.n. (JBSD); Monción, toward río Mao, 300 m, Ekman H12601 (G, GH, S); Loma del Barrero, Jarabacoa, ca 700 m, Ekman H14128 (A, S); Jarabacoa, at El Pedregal, ca 600 m, Ekman H14167 (S); Valle del Cibao, San Lorenzo, Ekman H14598 (S); Samaná los Haitises, near La Llanada, Ekman H15453 (S); Jarabacoa, 550 m, Fuertes 1637 (BR, F, G, GH); valley of the río Bao, 20 Apr 1979, Hernández s.n. (JBSD); El Rubio, 560 m, Jiménez 1050 (US); Los Montones, 800 m, Jiménez 1637 (US); La Leonor, 600 ft [183 m], Jiménez 2879 (US); just S of El Rubio, ca 425 m, Judd 1336 (NY); road between Guaco & Buena Vista at Hotel Montana, near Buena Vista, on road to Jaraboca, 610 m, Judd 2954 (BR, FLAS, G, IJ, NY, P, S, US); road between Constanza and Jarabacoa, ca 23 km N of El Río, 760 m, Judd 2956 (FLAS); road between Constanza & Jarabacoa, ca 3.1 km N of Paso Bajito, 1100 m, Judd 5131 (FLAS, JBSD, NY, S); ca 21 km N of El Río & 5.4 km S of Jarabacoa, 740 m, Judd 5142 (A, BR, FLAS, G, IJ, NY, S, US); Rancho Arriba,

800 m, Liogier 19383 (JBSD); between La Leonor & Monción, 500 m, Liogier 22611 (JBSD); Jicomé, 11 May 1950, Mera s.n. (US); La Cumbre [Paso Bajito], Raunkiaer 1090 (US); road between Constanza & Jarabacoa, ca 3.1 km N of Paso Bajito, 1100 m, Skean 1757 (A, B, BM, BR, DUKE, E, F, FLAS, G, GOET, IJ, JBSD, JE, K, L, M, MICH, MO, MSC, NY, P, S, UC, UCWI, US); ibid., ca 3.8 km N of Paso Bajito, 1070 m, Skean 1758 (A, B, BM, BR, DUKE, E, F, FLAS, G, GOET, IJ, JBSD, JE, K, L, M, MICH, MO, MSC, NY, P, S, UC, UCWI, US); ibid., just S of Paso Bajito, ca 10.7 km N of El Río, Skean 1771 (FLAS, JBSD, NY, S); ibid., N of Paso Bajito, ca 17.8 km N of El Río, 980 m, Skean 1772 (A, BM, BR, FLAS, G, IJ, JBSD, NY, S, US); ibid., N of Paso Bajito, ca 18.6 km N of El Río, ca 920 m, Skean 1773 (FLAS, JBSD); N of Paso Bajito, ca 19.1 km N of El Río (ca 7.3 km S of Jarabacoa), 890 m, Skean 1774 (A, FLAS, G, JBSD, NY, S, US); NW foothills of Loma de la Sal, ca 920 m, Skean 1776 (FLAS, JBSD, NY, S, US); 2.3 km W of Monción on road between Monción and La Leonor, 400 m, Skean 1796 (A, BM, BR, F, FLAS, G, IJ, JBSD, MO, NY, P, S, US); "Las Palmitas," 2.1 km N of El Rubio on road between Bulla & El Rubio, 495 m, Skean 1797 (FLAS, JBSD, NY, US); 1.5 km N of El Rubio on road between El Rubio & El Corozo (16.5 km W of San José de las Matas), 560 m, Skean 1798 (FLAS, JBSD, NY, S, US); Monción, 375 m, Valeur 431 (F, G, MO, S, US); Jicomé, district of San José de las Matas, 700 m, Valeur 753 (BM, IJ, S, US); top of Mt. Loma Larga, SE of Bonao at Falconbridge Dominicana mine & smelting plant, 18°45'N,

70°15′W, 1960 ft [598 m], Watson 1253 (FLAS); Loma El Caribe, Falconbridge Dominicana property, N of río Yuna, N of Bonao, 18°59′N, 70°24-25′W, 850 ft [259 m], Zanoni et al. 12799 (JBSD).--Cordillera Septentrional: Sierra de Palo Quemado, 600 m, Eggers 1859 (BM, BR, G, GOET, M, S); ibid., 1800 ft [549 m], Eggers 1896 (A, BM, BR, G, GOET, M); Palo Quemado, ca 600 m, Ekman H14302 (IJ, S); Sierra de Palo Quemado, 400-500 m, Liogier 10979 (F, IJ).--Sierra de Baoruco: between Palo Mino & Montesse on trail to Polo, Howard 12073 (BM, S).--Sierra de Neiba: El Cercado, Hondo Valle, 3500 ft [1067 m], Howard 9263 (BM, GH, S); road from Guayabal to Los Bolos, 18°37′N, 71°37′W, 1000-1500 m, Mejía & Zanoni 7202 (JBSD); along the Carretera Internacional ca 17.3 km N of La Descubierta, 920 m, Skean 1819 (A, BM, BR, FLAS, G, IJ, JBSD, NY, P, S, US); ibid., Skean 1820 (FLAS, JBSD, NY, US). HAITI. Chaine des Cahos: Section Dessalines, vicinity of Kalacroix, ca 700 m, Leonard 7858a (S, US).--Massif du Nord: Gros Morne, on the ridge between Morne Bonperè & Morne La Garde, ca 600 m, Ekman H4960 (S); steep slope E of Plaisance, ca 400 m, Leonard 7291 (BM, US); slope S of Ennery, 325-900 m, Leonard 9513 (F, MO, UC, US).--Plateau Central: near Paredon, ca 1000 ft [305 m], Proctor 10917 (IJ). WITHOUT SPECIFIC LOCALITY: Saint Domingue [Hispaniola, probably Massif du Nord-Cordillera Central], without date [1796-1801], Poiteau s.n. (P(fragment from Herb. Jussieu), photos at F, GH, NY).

Mecranium acuminatum is most closely related to M. amygdalinum. The two species form the most primitive clade within the genus, which is recognized here as section Sagraeoides. Both species possess the rather weak synapomorphies of plicate leaves, marsupiform mite domatia, and half-inferior ovaries. Though not a derived feature, both species lack calyptrae, a synapomorphy defining the remaining species in the genus, which are placed in sect. Mecranium. These two species are also similar in that they are extremely "weedy," occupying a diversity of disturbed habitats, even at relatively low elevations. Mecranium acuminatum may very well be derived from a population of M. amygdalinum that became isolated on the "north island" of Hispaniola and spread to all of the mountains north of the Cul de Sac. No autapomorphies have been shown for M. amygdalinum, a species that may be paraphyletic.

Mecranium acuminatum is distinct phenetically from M. amygdalinum (see discussion under Phenetic Studies), but the two taxa can only be differentiated by their petals. Mecranium acuminatum has petals that are narrowly triangular, with a single vein, while M. amygdalinum petals are broader, with multiple longitudinal veins. (See discussion under M. amygdalinum for a more detailed comparison of these two sister species).

The type collection of Mecranium acuminatum was collected by Bertero in 1819 or 1820 (see Jiménez 1985), and was described by de Candolle (1828) as Ossaea acuminata,

probably because of its narrow, sharp petals. Judd (in press) has discussed the confusion regarding the polyphyletic genus Ossaea, much of which is based on misinterpretation of inflorescence position and over emphasis on petal shape.

The name Melastoma micrantha Bert. ex DC. (de Candolle 1828), a later homonym of M. micrantha Sw. (Swartz 1788) [=Ossaea micrantha (Sw.) Cogn.] has also been applied to this species.

Mecranium section Mecranium

II. Mecranium section Mecranium.

Flower buds with a membranous calyptra formed by fusion of internal calyx lobes, the calyptra dome-like or rarely conical, 0.2-0.8 mm high, apiculate. Petals obovate, with rounded apices, each with a distinct apical notch. Ovary more or less inferior.

3. Mecranium racemosum (Griseb.) C. Wright in Sauvalle, Anales Acad. Ci. Med. Habana 5: 435. 1869. Cremanium racemosum Griseb., Catal. Pl. Cubens. 102. 1866.--TYPE: CUBA. Western Cuba [Pinar del Río]. Near La Palma [near Taco Taco], 4 Jul [1862, 1863, or 1864], Wright 2518, in part, collection "B," see discussion below (lectotype, here chosen: GOET!; isolectotypes: GH(left half of sheet)!, NY(right half of sheet from Herb. Torrey)!).

Shrub or small tree ca 2 m tall, perhaps larger. Twigs slightly to moderately 4-angled, 1-1.5 mm in diameter, sparsely to densely pubescent with unbranched to irregularly branched and matted multicellular hairs; internodes 0.8-4.3 cm long. Leaf blade coriaceous, narrowly ovate or elliptic, less commonly obovate, 2.1-9.4 cm long, 0.8-3.2 cm wide; apex acuminate; base acute or obtuse, less commonly rounded or cuneate; margin very obscurely serrate in distal ca 1/2, often revolute, especially near base; venation basal or slightly suprabasal, with 1 pair of conspicuous secondary veins joining midvein 0.5-2 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat, the intramarginal secondary veins and tertiary veins flat or not visible; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins flat, the surface often pubescent with hairs similar to those on stem, especially concentrated in persistent axillary tufts at junction of midvein and largest secondary veins, and with scattered minute, glandular hairs; marsupiform domatia absent. Petiole 4-25 mm long, with indumentum like that of stem. Inflorescences borne in leaf axils and on leafless nodes below leaves, spindly, 1.4-5.5 cm long, 0.5-3 cm wide, 1-branched; peduncle 3-16 mm long. Hypanthium ± cylindrical, ca 1.9 mm long, ca 1.6 mm wide, pubescent with

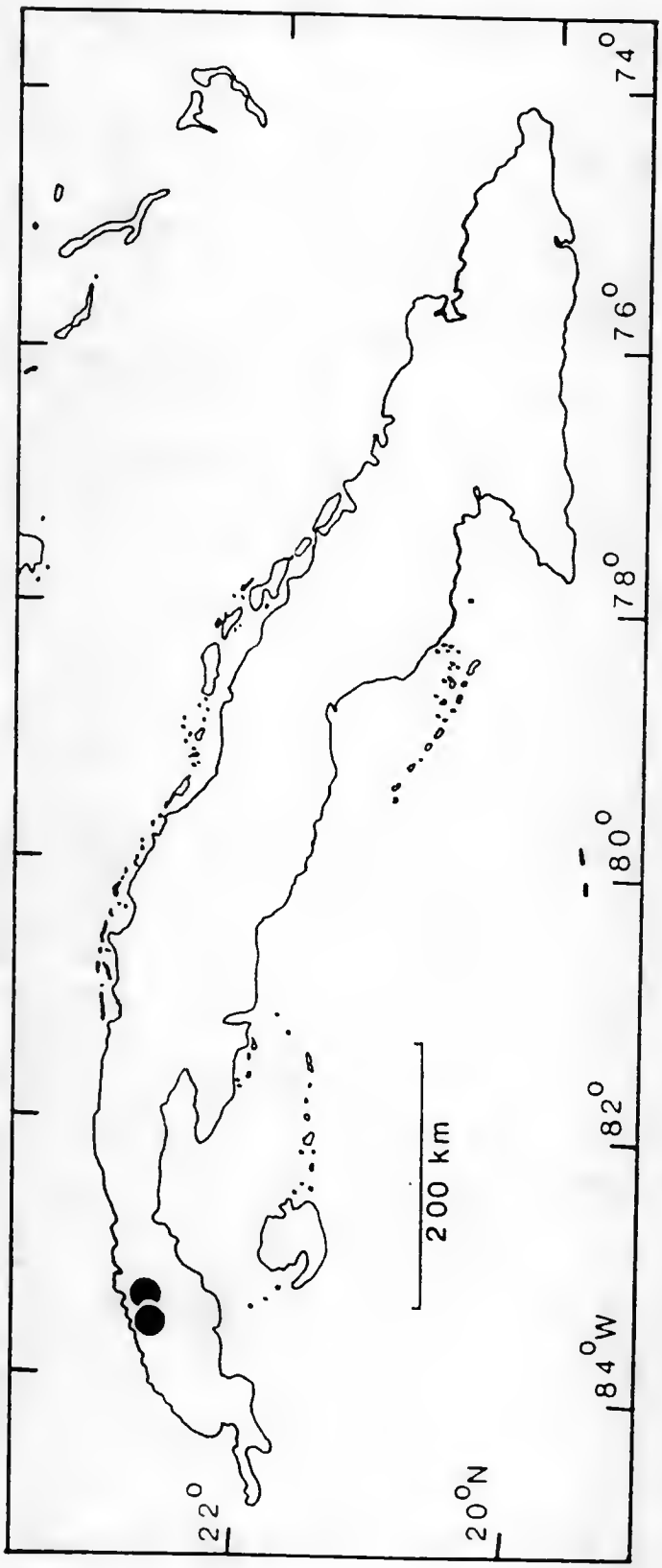
minute glandular hairs, the portion free from ovary ca 0.6 mm long; portion of calyx bearing external teeth ca 0.3 mm long. Calyx teeth ca 0.4 x 0.8 mm. Calyptra conspicuous in bud, ± conical. Petals white, obovate, ca 2.0 mm long, ca 1.3 mm wide, slightly cupped adaxially, reflexed; apex rounded, emarginate. Stamens white; proximal segment narrowly obovate, 1.1-1.4 mm long, ca 0.3 mm wide; distal segment narrowly ovate, ca 1.3 mm long, ca 0.3 mm wide, the anther sacs ca 1.2 mm long, opening by a single apical pore. Ovary inferior, ca 1.5 mm long, ca 1.2 mm wide, the apical appendage ca 0.4 mm high; style white, strongly curved, ca 4.2 mm long, ca 0.4 mm wide; stigma ca 0.3 mm wide, not expanded. Immature berries ca 4 x 4 mm, strongly constricted near apex, glabrous or sparsely pubescent with minute glandular hairs; immature seeds ca 0.4 x 0.2 mm. Mature fruits and seeds not known.

Phenology. Mecranium racemosum is known to flower in July and probably produces mature fruits by early autumn.

Distribution and Habitat. Cuba (Fig. 26): endemic to the Sierra del Rosario in Pinar del Río province.

ADDITIONAL SPECIMENS EXAMINED. CUBA. Western Cuba [PINAR DEL RIO]: Pinal Rangel [Los Organos, near Taco Taco or Santa Cruz], 6 Aug [1862], Wright 2518, in part, collection "C," see discussion below (GOET!, NY(left half of sheet from Herb. Torrey)!, NY (sheet from College of Pharmacy)!).

Fig. 26. Distribution of Mecranium racemosum.


74°
76°
78°
80°
82°
84°W
22°
20°N
200 km

Mecranium racemosum is a primitive species within sect. Mecranium that has sagraeoid anthers, an unusual conical calyptra, and berries that are relatively strongly constricted near their apices. This pubescent species is vegetatively similar to M. integrifolium and M. obtusifolium.

As mentioned under M. obtusifolium, the collection Wright 2518 comprises discordant elements representing two taxa from three different localities. I have lectotypified M. racemosum by choosing a sheet at GOET that bears only material from collection "B" (see discussion of collections "A," "B," and "C" under M. obtusifolium). Collection "B" was made near La Palma and collection "C" was made at Pinal Rangel. Both collections represent M. racemosum, and these localities are the only ones cited in Grisebach's (1866) original description. Collection "A" was made at Arroyo Caballo and was later named by Cogniaux (1891) as Mecranium obtusifolium.

The specific epithet of M. racemosum probably refers to the long, spindly, 1-branched inflorescences of this species.

4. Mecranium crassinervum (Urban) Skean, comb. nov., Ekmaniocharis crassinervis Urban, Ark. Bot. 17 (7): 48. 1921.--TYPE: HAITI. Dépt. du Sud: Morne La Hotte [Massif de la Hotte, Morne Vanderveld], on steep NE

slopes in montane woods, ca 800 m, fl, 10 Jun 1917, Ekman H208 (holotype: S!; isotype: S!).

Shrub or small tree to ca 2.5 m tall. Twigs slightly 4-angled, soon becoming rounded, 2-3 mm in diameter on internodes, with a prominent collar-like flange, ca 1-3 mm wide, encircling each node and making total nodal diameter 4-7 mm, smooth, essentially glabrous, but youngest buds and nodal ridges often with a few unbranched to irregularly branched and matted multicellular hairs, often hidden beneath nodal flanges; internodes (1) 2.2-5.4 (6.8) cm long. Leaf blade coriaceous, ovate, less commonly elliptic, 3.4-11 (12.8) cm long, (1.5) 2.5-5.4 cm wide; apex acuminate or acute, often curved downward; base slightly or strongly cordate, less commonly rounded; margin plane, or often revolute near base, obscurely serrate ± throughout, with teeth terminated by caducous, multicellular, apically-curved, acicular projections to ca 1.5 mm long and ca 0.2 mm wide at base; venation suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 1-3 (5) mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein, largest pair of secondary veins, and tertiary veins strongly impressed in living material, often flattening upon drying; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher

order veins flat, the surface essentially glabrous, but with scattered minute, glandular hairs; marsupiform domatia and persistent axillary hair tufts absent. Petiole 3-11 mm long, glabrous. Inflorescences borne in leaf axils and on leafless nodes below leaves, 2.5-7.1 cm long, 1.5-3.6 cm wide, 1-2 branched, the caducous bracts to ca 2.1 mm long, rarely these bracts persistent and foliar, with blades to ca 1.9 x 0.7 cm and petioles ca 1 mm long; peduncle (6) 15-23 (31) mm long. Hypanthium cylindrical or very slightly obconical, 2-2.8 mm long, 1.9-2.4 mm wide, smooth, very sparsely pubescent with minute glandular hairs; portion free from ovary 0.7-1.2 mm long; portion of calyx bearing external teeth ca 0.4 mm long. Calyx teeth ca 0.5 x 0.4 mm, often with caducous acicular apices. Calyptra conspicuous in bud, the caducous apiculum ca 0.1 mm long. Petals purple, obovate, 2.1-3.5 mm long, 1.4-1.9 mm wide, reflexed; apex rounded, emarginate. Stamens purple with white anther sacs; proximal segment 1.8-2.4 mm long narrowly obovate, ca 0.4 mm wide; distal segment narrowly ovate or oblong, 1.7-2.1 mm long, ca 0.5 mm wide, the anther sacs 1.5-1.8 mm long, opening confluently by a single small apical pore, the connective prolonged 0.2-0.3 mm beyond bases of anther sacs. Ovary inferior, 1.2-1.9 mm long, 1.4-1.8 mm wide, the apical appendage ca 0.8 mm high; style light purple, strongly curved, 4.6-5.8 mm long, ca 0.5 mm wide; stigma ca 0.25 mm wide, not expanded. Immature berries green, tinged with red-purple, turning deep purple-black, urceolate, ca 4 x 5

mm, very sparsely pubescent with minute glandular hairs. Immature seeds tan, ca 0.6 x 0.4 mm. Mature fruits and seeds not known. Fig. 27.

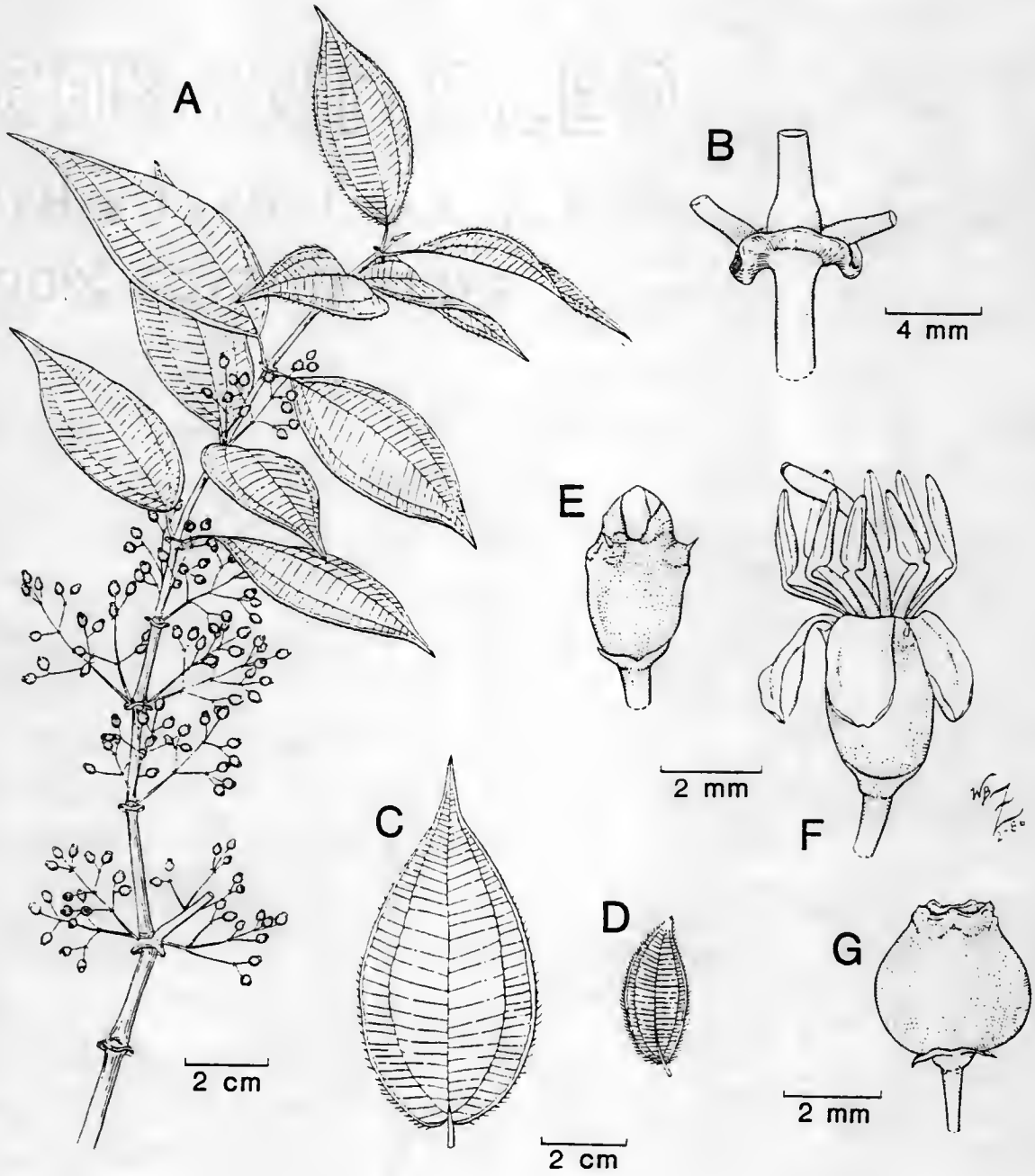
Phenology. Flowering material of this rare species has only been collected in June and early July. Mature fruits of M. crassinervum are unknown.

Distribution and Habitat. Hispaniola (Fig. 24): endemic to low elevation "rak bwa," i.e. hardwood forests on karst, of the Massif de la Hotte of Haiti; 800-905 m. For detailed discussions of the vegetation of this region and localities of populations of this species see Judd (1987), and Skean (1989).

ADDITIONAL SPECIMENS EXAMINED. HAITI. DÉPT. DU SUD (all from the Massif de la Hotte): between Les Platons & Formon, ca 800 m, Ekman H7419 (GH, IJ, S); ca 2 km N of Les Platons along trail from Les Platons to Sou Bwa, ca 850 m, Skean 1642 (FLAS, NY); ibid., ca 0.75 km S of Sou Bwa, ca 50 m S of house of Auprano Despagne, ca 905 m, Skean 1660 (A, BM BR, F, FLAS, G, GOET, IJ, JBSD, M, MO, NY, P, S, US); ibid., Skean 1665 (A, FLAS, NY, S, US); ibid., Skean 2079 (FLAS, NY, S, US); ibid., Skean 2115 (FLAS, NY, S).

Mecranium crassinervum differs from all other members of the genus in possessing well-developed nodal flanges (Fig. 27B). These stem outgrowths were distinct enough for Urban (1921) to recognize this taxon as Ekmaniocharis

Fig. 27. Mecranium crassinervum (Skean 1665 unless otherwise indicated). A. Habit. B. Nodal Flange. C. Leaf, adaxial surface (from isotype). D. Young leaf, abaxial surface (from isotype). E. Flower bud. F. Flower. G. Young fruit.


A
2 cm
B
4 mm
C
2 cm
D
E
2 mm
F
G
2 mm

crassinervis, representing a monotypic genus commemorating his collaborator, Erik Ekman. Cladistic studies clearly have shown that the phylogenetic placement of this species is nested among primitive members of the genus Mecranium, and the species is transferred here to this genus (see discussion under Phylogeny). Similar nodal outgrowths are found in Miconia, e.g., M. condylata Wurdack, and do not warrant generic recognition, even on phenetic grounds.

Mecranium crassinervum is adjacent phylogenetically to M. racemosum and M. haitiense. It is not likely to be confused with these species, or with any other species in the genus. Its distinctive nodal flanges, leaves with impressed veins, and flowers with purple petals and sagraeoid anthers make it very easy to recognize. The young leaves characteristically bear very conspicuous marginal, multicellular, acicular projections (Fig. 27D), which are much less developed in other species of the genus. In dried material of M. crassinervum the leaves are generally olive green above and golden-brown below.

Unfortunately, M. crassinervum may be the species of Mecranium most threatened by extinction. The lower elevation montane forests of the Massif de la Hotte, where this species is endemic, have essentially been destroyed by clear-cutting and burning for agricultural purposes and charcoal production (Skean 1989).

The holotype of this species (Ekman H208) was deposited at Stockholm (S) and not at Berlin (B), unlike the vast

majority of Urban types, which were destroyed in 1943 (see Sleumer 1949). Placing the holotype at S may have been in tribute to the namesake for Ekmaniocharis, since S was his home institution. The specific epithet refers to the conspicuous nerves in the leaves, which appear especially thickened upon drying.

5. Mecranium haitiense Urban, Ark. Bot. 17 (7): 46. 1921.--TYPE: HAITI. Dépt. du Sud: "La Hotte" [Massif de la Hotte, western group, NE slopes of Morne Vanderveld], mountain woods on rocky ground, 800 m, fl, 11 Jun 1917, Ekman H150 (holotype B, destroyed; isotype: S!)

Mecranium salicifolium Urban, Ark. Bot. 22A(17): 54. 1929.--TYPE: HAITI. Dépt. du Sud: Massif de la Hotte, western group, near Torbec, Morne Formon, steep slope of ravine, 1450 m, 28 Dec 1926, Ekman H7443 (holotype B, destroyed; isotypes: B!, K!, EHH!, S!, US!).

Shrub or small tree to ca 4.5 m tall. Twigs slightly to moderately 4-angled, 1-3 mm in diameter, smooth, essentially glabrous, but youngest buds and nodal ridges often with a few unbranched to irregularly branched and matted multicellular hairs; internodes 1.2-4.6 cm long. Leaf blade coriaceous, ovate or narrowly ovate, less commonly narrowly elliptic, 3.4-9.2 cm long, 1-3.4 cm wide, often red-purple; apex acuminate; base cuneate or slightly

decurrent, less commonly acute or obtuse; margin obscurely serrate in distal ca 3/4, often appearing entire because slightly revolute; venation suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 1-6 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins not visible; abaxial surface with midvein raised, the largest pair of secondary veins slightly raised, the intramarginal secondary veins flat or very slightly raised, the tertiary veins weakly developed, about the same size as quaternary veins, the tertiary and higher order veins slightly impressed or flat, the surface essentially glabrous, but with some scattered minute, glandular hairs; marsupiform domatia and persistent axillary hair tufts absent. Petiole 3-9 mm long, glabrous. Inflorescences borne in leaf axils and on leafless nodes below leaves, 1.3-5.1 cm long, 0.4-4 cm wide, usually 1-branched; peduncle 1-14 mm long. Hypanthium narrowly obconical, ca 3.3 mm long, 2.4-2.9 mm wide, very sparsely pubescent with minute glandular hairs, the portion free from ovary ca 0.9 mm long; portion of calyx bearing external teeth ca 0.3 mm long. Calyx teeth ca 0.3 x 0.3 mm. Calyptra conspicuous in bud, not extended beyond calyx teeth, tearing ± evenly into 4 triangular lobes, each ca 1.2 x 1.8 mm, the caducous apiculum ca 0.2 mm long. Petals pink, obovate, 3.7-3.9 mm long, 1.8-3.7 mm wide,

slightly cupped adaxially, spreading; apex rounded, emarginate. Stamens pink with anther sacs whitish; proximal segment narrowly obovate, 2.2-2.4 mm long, 0.5-0.7 mm wide; distal segment narrowly ovate, 1.9-2.2 mm long, ca 0.8 mm wide, the anther sacs 1.7-2 mm long, opening by a single small apical pore. Androecial fringe 0.2-0.3 mm high. Ovary inferior, 2.1-2.4 mm long, 1.7-2 mm wide, the apical appendage 0.5-0.6 mm high; style pink, straight or slightly curved, 4.2-5.1 mm long, ca 0.6 mm wide; stigma ca 0.5 mm wide, not expanded. Berries ca 6 x 6 mm, purple-black, glabrous or with a few minute glandular hairs; seeds ca 0.6 x 0.3 mm. Fig. 28.

Phenology. Mecranium haitiense is known to flower from February to June and to bear mature fruits in August.

Distribution and Habitat. Hispaniola (Fig. 29): endemic to the Massif de la Hotte of Haiti. This species occurs in "rak bwa" (i.e., low elevation montane hardwood forest on karst) and low elevation broad-leaved cloud forests; 800-1450 m.

ADDITIONAL SPECIMENS EXAMINED. HAITI. DÉPT. DU SUD (all from the Massif de la Hotte): Pestel, Morne Delcour, 800 m, Ekman H8988 (EHH, IJ, S, US); ibid., 1000 m, Ekman H9006 (A, G, IJ, NY, S); Bwa Formon, N of base camp, 1200 m, Judd 3932 (FLAS, NY, S); ibid., along trail between Sou Bwa and Ville Formon, ca 0.5 km N of Sou Bwa, 950-970 m, Skean 1258 (FLAS, NY); ibid., ridge ca 1 km E of base camp, 1000

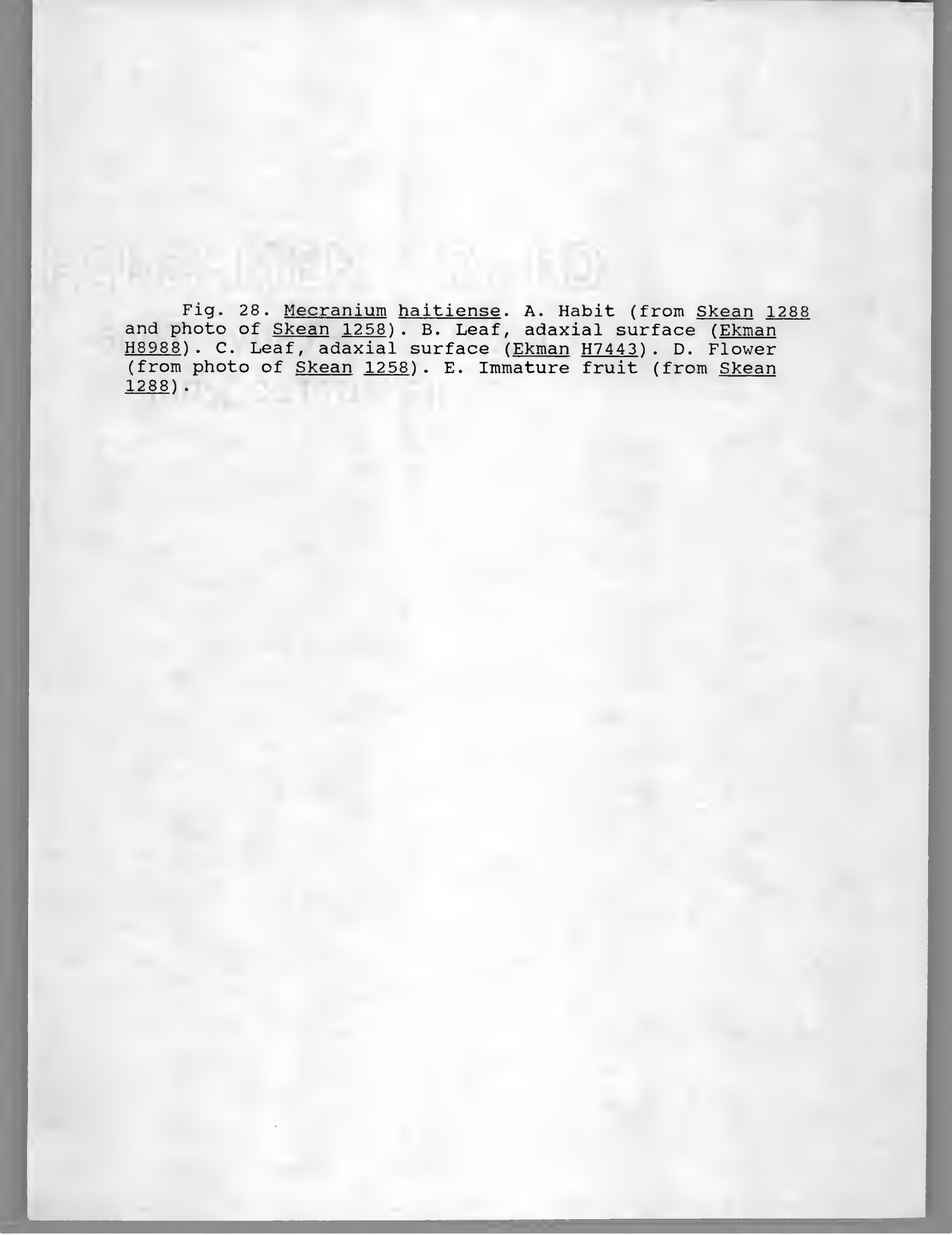


Fig. 28. Mecranium haitiense. A. Habit (from Skean 1288 and photo of Skean 1258). B. Leaf, adaxial surface (Ekman H8988). C. Leaf, adaxial surface (Ekman H7443). D. Flower (from photo of Skean 1258). E. Immature fruit (from Skean 1288).

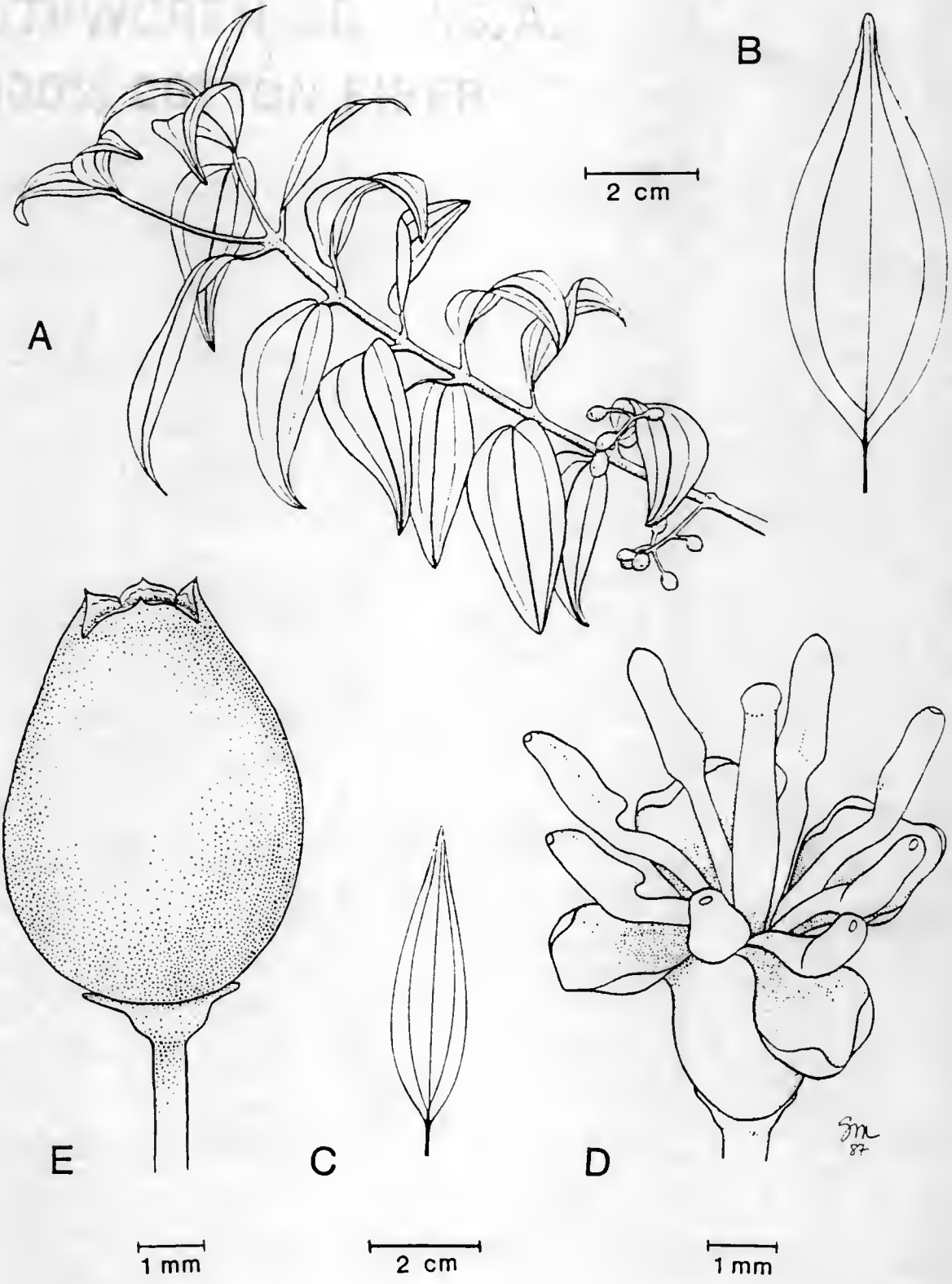
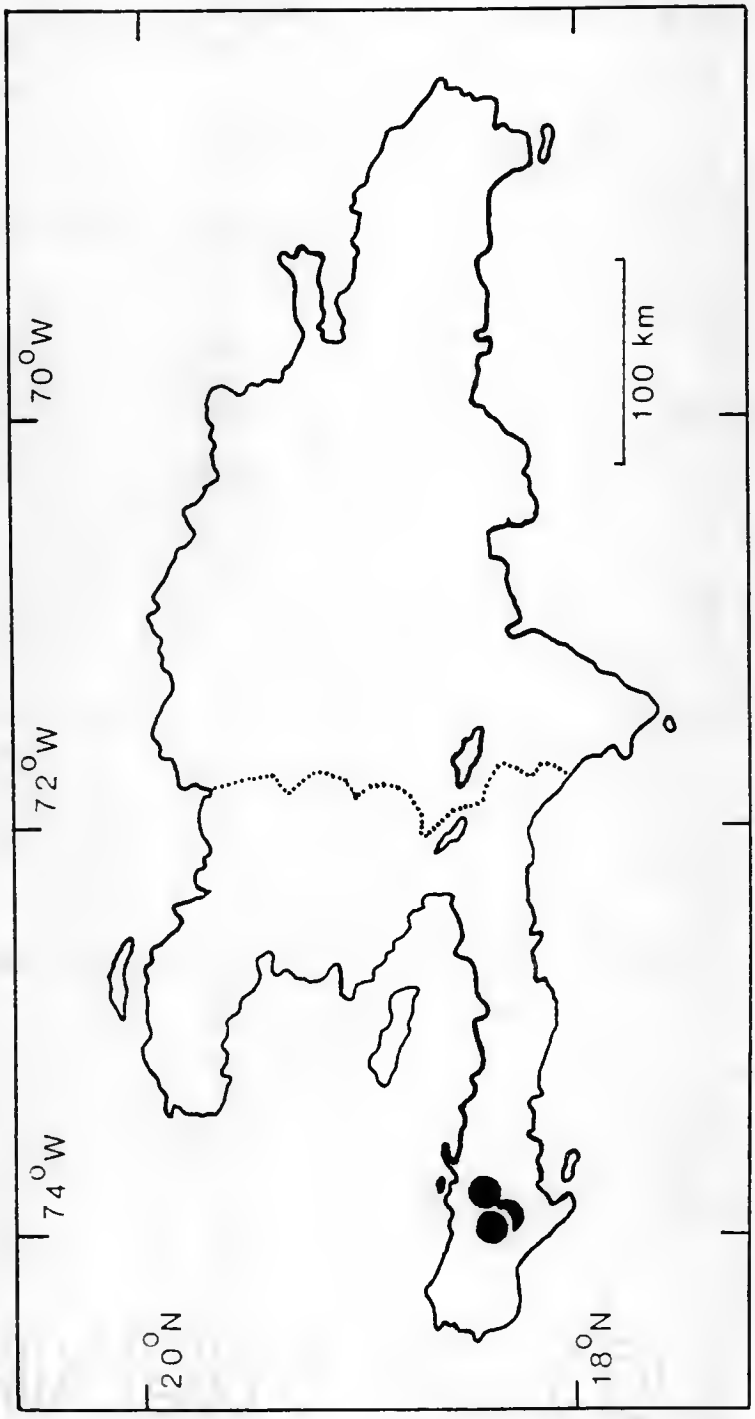

A
B
2 cm
E
C
D
1 mm
2 cm
1 mm

Fig. 29. Distribution of Mecranium haitiense.


70°W
72°W
74°W
20°N
18°N
100 km

m, Skean 1288 (A, BR, FLAS, G, IJ, JBSD, NY, S, US); same as 1258, Skean 1553 (FLAS), 1557 (FLAS, NY, S); level plain S of Morne Cavalier, ca 1200 m, Skean 1651 (A, FLAS, G, IJ, JBSD, NY, S, US); same as 1258, Skean 1661 (FLAS, NY, S); same as 1258, Skean 2092 (FLAS, NY, S).

Mecranium haitiense is a primitive member of sect. Mecranium with pink petals and sagraeoid anthers. This species is adjacent phylogenetically to M. crassinervum, also endemic to the Massif de la Hotte, and M. purpurascens, a species from high elevations in the Blue Mountains of Jamaica (see Key for separation of these species).

Narrow-leaved specimens of M. haitiense from ca 1450 m elevation on Morne Formon were described by Urban (1929) as M. salicifolium. This typological entity represents an extreme in variation of leaf size and margin. Leaves of plants growing at lower elevations are longer and wider than those at upper elevations, and have more conspicuous teeth. I have observed complete intergradation in the populations near Morne Formon. Similar elevational variation in size occurs in other taxa of Mecranium (e.g., M. integrifolium subsp. neibense).

The leaves of M. haitiense are often tinged heavily with red-purple, and have tertiary veins that are weakly developed, i.e., no thicker that the quaternary veins when observed on the abaxial leaf surface. The species lacks

marsupiform domatia or persistent axillary tufts of hairs located at the junction of the midvein and secondary veins.

Mecranium haitiense may hybridize with M. revolutum, a sympatric species having white flowers with "mecranioid" anthers. A single sterile collection (Skean 2093; FLAS, IJ, S, US) appears morphologically intermediate between these two species.

Vegetative material of M. microdictyum, a white-flowered species of sympatric occurrence, may be confused with sterile material of M. haitiense. The leaves of M. microdictyum have abaxial marsupiform domatia, which are lacking in M. haitiense.

The name Mecranium valde Urban, a nomen nudum, was published by Barker and Dardeau (1930) for M. salicifolium [=M. haitiense]. I have seen a sheet of Ekman H7443 at EHH bearing a label that reads "M. valde aff. M. haitiense," which was probably the source of this name.

6. Mecranium purpurascens (DC.) Triana, Trans. Linn. Soc. 28: 139. 1871. Ossaea purpurascens DC., Prod. 3: 169. 1828.--TYPE: JAMAICA. High mountains, without specific locality [Blue Mtns.], without date [1785-86], Swartz s.n. (lectotype, here designated: S!; isolectotypes: BR, G (IDC microfiche 2562)!, S, in part!).

Miconia ossaeiformis Naudin, Ann. Sci. Nat. Bot. Sér. 3. 17: 212. 1851. Sagraea ossaeiformis (Naudin)

Triana, Trans. Linn. Soc. 28: 138. 1871. Clidemia ossaeiformis (Naudin) Cogn. in A. & C. DC., Mon. Phan. 7: 982. 1891.--TYPE: ANTILLES. Without specific locality [Jamaica, Blue Mountains], Forsyth s.n. (lectotype, here designated: P!).

Shrub or small tree to ca 7 m tall. Twigs slightly to moderately 4-angled, 1-2 mm in diameter, smooth, essentially glabrous, but youngest buds and nodal ridges often with a few unbranched to irregularly branched and matted multicellular hairs; internodes 0.9-2.9 (4.5) cm long. Leaf blade coriaceous, obovate or elliptic, less commonly narrowly ovate, 2.3-8 cm long, 1.1-3.4 cm wide; apex acuminate; base cuneate or slightly decurrent; margin obscurely serrate in distal ca 3/4, but often appearing entire because slightly revolute; venation basal or suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 1-4 (9) mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat or not visible; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins usually slightly raised, the surface essentially glabrous, but with some scattered minute,

glandular hairs; marsupiform domatia sometimes present on abaxial surface in axils at junction of midvein and largest secondary veins, persistent axillary hair tufts absent. Petiole 5-17 mm long, glabrous. Inflorescences borne in leaf axils and on leafless nodes below leaves, 1.7-6.8 cm long, 0.7-3.9 cm wide, 1-2 branched; peduncle 8-29 (39) mm long. Hypanthium slightly obconical or subglobose, 2.7-3.7 mm long, 2.4-4.1 mm wide, very sparsely pubescent with minute glandular hairs, the portion free from ovary 0.9-1.6 mm long; portion of calyx bearing external teeth 0.3-0.9 mm long. Calyx teeth ca 0.25 x 0.25 mm. Calyptra conspicuous in bud, the caducous apiculum to ca 0.3 mm long. Petals white, often tinged pink basally, obovate, 3.3-4.2 mm long, 1.7-3.1 mm wide, slightly cupped adaxially, often reflexed; apex rounded, emarginate. Stamens white; proximal segment elliptic or narrowly ovate, 1.9-3 mm long, 0.5-0.8 mm wide; distal segment elliptic or slightly obovate, 1.8-3.2 mm long, 0.4-0.7 mm wide, the anther sacs 1.3-2.2 mm long, opening by a single small apical pore. Ovary inferior, 1.6-2.5 mm long, 1.1-2.7 mm wide, the apical appendage 0.6-1.2 mm high; style white, often strongly curved, 4.2-7.2 mm long, 0.4-0.7 mm wide; stigma 0.2-0.4 mm wide, not expanded. Berries ca 7 x 6 mm, purple-black, glabrous or with a few minute glandular hairs; seeds ca 0.8 x 0.5 mm. Fig. 30A.

Phenology. Mecranium purpurascens flowers primarily from August through October, with fruits produced through February.

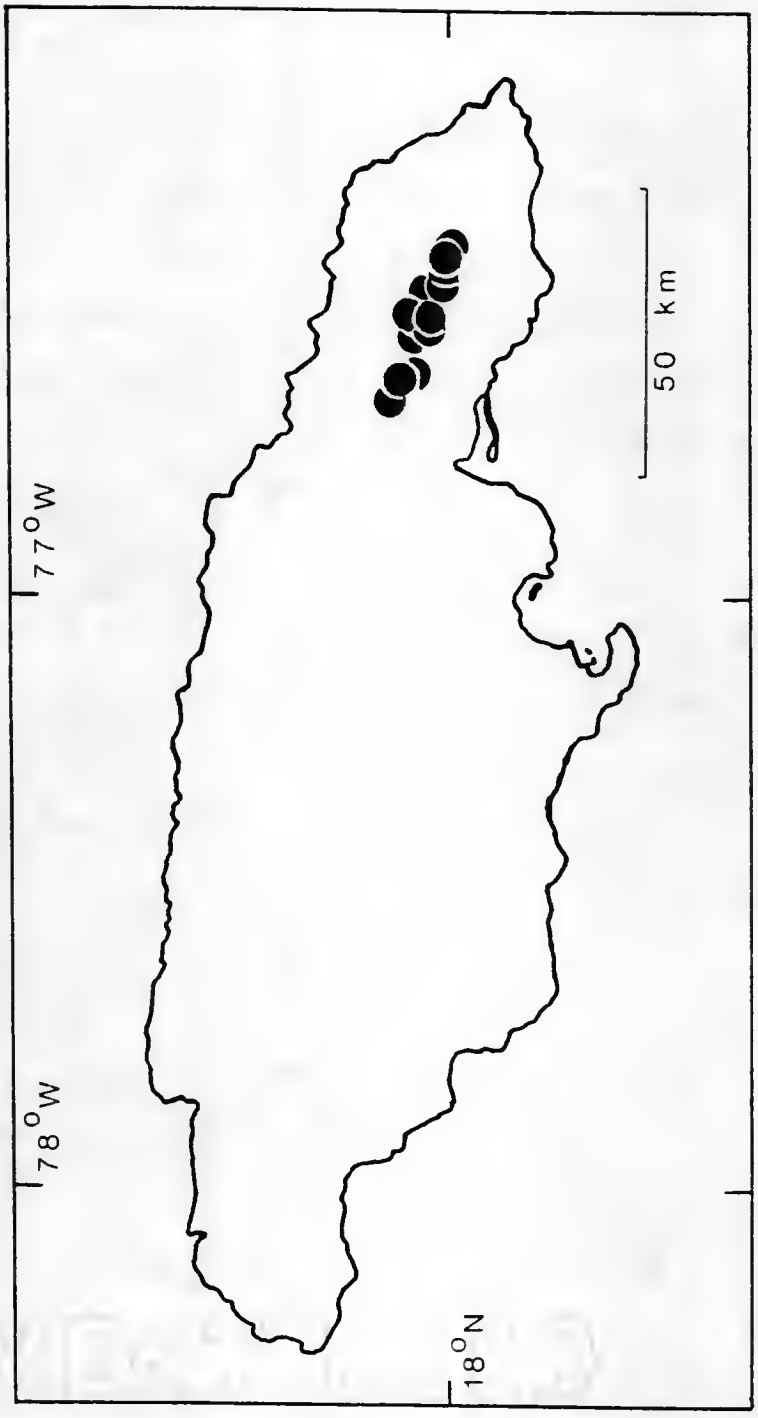
Fig. 30. Photographs of M. purpurascens and M. axillare subsp. proctori. A. M. purpurascens, habit (ca 0.4x). B. M. axillare subsp. proctori, habit (ca 0.5x).

A
B

Distribution and Habitat. Jamaica (Fig. 31): endemic to broad-leaved cloud forests in the higher elevations of the Blue Mountains; (1070) 1250-2250 m.

ADDITIONAL SPECIMENS EXAMINED. JAMAICA (all from the Blue Mountains, including the Port Royal Mountains). PORTLAND: Trail to Old England, W and N of Hardwar Gap, 4100-4300 ft [1250-1310 m], Hespenheide 716 (DUKE).--ST. ANDREW: Morce's Gap, 5000 ft [1525 m], Adams 11354 (BM, DUKE, UCWI); Vicinity of Cinchona, St. Helen's Gap to Morce's Gap, E. Britton 3851 (NY, US); ibid., Britton 100 (F, NY, US); Mt. Horeb trail, Fairey Glade, ca 4100 ft [1250 m], Crosby et al. 302 (DUKE, F, GH, MO, NY, UC, US); Cinchona, leeward slopes, J. Harris & Lawrence C15352 (NY), C15356A (US); Mt. Horeb, trail above Newcastle, ca 4400-4500 ft [1340-1370 m], Hespenheide 1435 (DUKE, F, GH, MO, NY, US); Hardwar Gap, along "Waterfall Trail" & Oatley Road, 1200-1250 m, Judd 5426 (FLAS, IJ, NY); Mt. Horeb, on the top, ca 1450 m, Judd 5448 (FLAS, IJ, NY); near Cinchona, without date, Morris s.n. (NY); summit of John Crow Peak, 6600 ft [2012 m], Philipson 838 (BM, IJ, NY); near Morce's Gap, 5000 ft [1525 m], Philipson 1224 (MO); W slope of Mt. Horeb, above Hardwar Gap, ca 4250 ft [1295 m], Proctor 9884 (IJ); along trail between Clydesdale and Morce's Gap, 3500-4900 ft [1070-1495 m], Proctor 22668 (IJ); Clydesdale, 3500 ft [1070 m], 28 Aug 1948, Serrant s.n. (IJ); Mt. Horeb, on the top, 1495 m, Skean 1881 (A, BR, FLAS, G, GOET, IJ, JBSD,

Fig. 31. Distribution of Mecranium purpurascens.


77°W
78°W
18°N
50 km

NY, S, US); along trail down Mt. Horeb to Fairey Glade, 1480 m, Skean 1886 (FLAS, IJ, NY); ibid., 1400 m, Skean 1890 (A, FLAS, G, IJ, JBSD, NY, S, US); Fairey Glade, Mt. Horeb, 1380 m, Skean 1894 (FLAS, IJ, NY, US); ibid., Skean 1895 (FLAS, IJ, NY, US); ibid., Skean 1896 (FLAS, IJ); Holleywell Gardens, along the "Waterfall Trail," 1225 m, Skean 1906 (FLAS, IJ); ibid., 1250 m, Skean 1907 (FLAS, IJ); Holleywell Gardens, along the "Shelter Trail," originating near the rental cabins, 1245 m, Skean 1911 (FLAS, IJ, NY, S, US); ibid., 1230 m, Skean 1912 (FLAS, IJ); Fairey Glade, on slope of Mt. Horeb, Stearn 45 (A, BM, FLAS, S, UCWI); Port Royal Group, Caledonia Peak and vicinity, 2 mi NW of Hardwar Gap, 76°45'W, 18°16'N, 4250-4500 ft [1295-1370 m], Webster & Wilson 4941 (A, G, IJ, S); along track through Fairey Glade to Mt. Horeb, above Hardwar Gap, West & Arnold 508 (FLAS, GH).--ST THOMAS: Blue Mtn. Peak, 6200 ft [1890 m], Adams 10659 (UCWI); East Peak of Blue Mtn. Peak, 7375 ft [2250 m], Anderson & Sternberg 3386 (DUKE, GH); W slope of Blue Mtn. Peak, ca 6500 ft [1980 m], 6 Sep 1947, Bengry s.n. (IJ); Between Blue Mtn. Peak and Portland Gap, ca 6500-7400 ft [1980-2250 m], Crosby et al. 910 (F, GH, MO, NY, UC); Abbey Green, 4000 ft [1220 m], Harris 6274 (F); Blue Mtn. Peak, 14 Dec 1890, Hitchcock s.n. (MO); ibid., Middle Peak and trail to East Peak, 7375-7402 ft [2242-2250 m], Judd 5376 (A, BR, FLAS, G, GOET, IJ, JBSD, NY, S, US); ibid., East Peak near marker, 7375 ft [2242 m], Judd 5377 (FLAS, IJ, NY, S, US); ibid., trail from Middle Peak to Portland Gap, 1900 m, Judd

5393 (FLAS, IJ); lower W ridge of Blue Mtn. Peak, 1700-1950 m, Maxon 9817 (NY, US); upper W slope of Blue Mtn. Peak, ca 7000 ft [2135 m], Proctor 7228 (IJ); W slopes of Blue Mtn. Peak between Portland Gap & the top, 1930 m, Skean 1923 (FLAS, IJ, NY, US); ibid., 1940 m, Skean 1925 (FLAS, IJ, NY); ibid., 1960 m, Skean 1926 (FLAS, IJ); ibid., 1970 m, Skean 1927 (FLAS, IJ); ibid., 2030 m, Skean 1928 (FLAS, IJ, NY); ibid., 2050 m, Skean 1930 (FLAS, IJ, NY, S, US); ibid., 2125 m, Skean 1932 (FLAS, IJ, NY, S, US); ibid., 2130 m, Skean 1933 (FLAS, IJ, NY); ibid., 2135 m, Skean 1935 (FLAS, IJ, NY); ibid., 2160 m, Skean 1936 (FLAS, IJ); ibid., 2160 m, Skean 1937 (FLAS, IJ, NY, US); ibid., 2165 m, Skean 1938 (FLAS, IJ, NY, US); ibid., 2220 m, Skean 1940 (FLAS, IJ, NY); trail from Whitfield Hall to Blue Mtn. Peak, 7000 ft [2135 m], Weaver 1145 (DUKE); trail from Portland Gap to Blue Mtn. Peak, 6000-7000 ft [1830-2135 m], Weaver 1943 (DUKE); between Portland Gap and Blue Mtn. Peak, ca 6500 ft [1980 m], Webster & Wilson 5438 (BM, IJ, S).--WITHOUT SPECIFIC LOCALITY [Jamaica, Blue Mountains]. Anon. (G); Antilles, Anon. (BR); Eggers 3622 (BR); Hart s.n. (NY); Lambert s.n. (P, from Herb. Bonpl.); Lee s.n. (P, from Herb. Bonpl.); Blue Mountains, ca 1220-1830 m, 12 Dec 1890, Rothrock 435 (F).

Mecranium purpurascens is a glabrous and relatively primitive species within sect. Mecranium that may be most closely related to M. virgatum, a species endemic to eastern

and central Jamaica. The anthers of M. purpurascens open by a single apical pore, and are often slightly obovate with somewhat reduced anther sacs. Its petals are white, but are often tinged with pink at their bases, while those of the phylogenetically adjacent and more primitive M. haitiense are pink.

Mecranium purpurascens may be differentiated quite easily from the other two Jamaican species of the genus, using the characters of pubescence, inflorescence position, flower size, and hypanthium shape (see Appendix C). Mecranium virgatum is a glabrous species with larger flowers that are borne exclusively on old wood below the leaves, and which have hypanthia with prolonged bases and anthers that open by an unusual gaping foramen. Mecranium axillare has smaller flowers, and in the taxa sympatric with M. purpurascens, M. axillare subsp. axillare and M. axillare subsp. procteri, the leaves often bear tufts of hairs on their abaxial surfaces at the junction of the midvein and the two largest secondary veins. In the Blue Mountians, where the three Jamaican species are largely isolated elevationally, different flowering times may serve to isolate them reproductively where they are sympatric (see discussion under Ecology).

In populations of M. purpurascens on the high ridges of Blue Mountain Peak (above 1975 m) there are some individuals, especially at East Peak, with narrow leaves and often abaxial marsupiform domatia located at the junction of

the midvein and the two largest secondary veins. These individuals intergrade with broader-leaved individuals lacking such domatia. Proctor (1972) thought that these plants might represent an undescribed species intermediate between M. purpurascens and M. amygdalinum [=M. axillare].

A specimen having features of M. purpurascens and M. axillare is known from a single collection (Proctor 9980; IJ, NY) made in the John Crow Mountains 1.5-2 mi SW of Ecclesdown at elevations of 1500-2000 ft [460-610 m]. The specimen is most similar to M. purpurascens, but has pink-petaled flowers that are approximately the same size (hypanthium ca 1.7 x 1.7 mm, petals ca 2.3 x 1.4 mm) as those of M. axillare. This collection may represent an undescribed species.

In vegetative condition, plants of M. purpurascens are often mistaken for the terminal-flowered species, Miconia rubens (Sw.) Naudin and M. theazens (Bonpl.) Cogn., other Miconieae of the high elevations of the Blue Mountains. Upon close examination, the dried leaves of M. purpurascens have their smallest veinlets raised, unlike these Miconia species. This character is also observable in shade leaves and sucker-sprouts of M. purpurascens, which tend to have ovate leaves.

Swartz (1788) first described this species as Melastoma purpurascens Sw., a later homonym of M. purpurascens Aublet, a species now known as Aciotis purpurascens (Aublet) Triana.

7. Mecranium ovatum Cogn. in Urban, Symb. Antill. 7: 528. 1913.--TYPE: SANTO DOMINGO [DOMINICAN REPUBLIC]. Barahona: Sierra de Baoruco, near Barahona, between the forks of the rivers Cañada Maluca, 1450 m, fl, Apr 1912, Fuertes 1500 (holotype: B, presumed destroyed; isotypes: A(2)!, BR(2)!, F!, G!, GH!, L!, NY!, S!, US!).

Shrub or small tree to ca 6 m tall; older stems often nodose. Twigs slightly to moderately 4-angled, 1.5-3 mm in diameter, smooth, essentially glabrous, but youngest buds and nodal ridges often with a few unbranched to irregularly branched and matted multicellular hairs; internodes (0.8) 1.3-5.2 (6.9) cm long. Leaf blade coriaceous, ovate or elliptic, rarely obovate, (3.1) 4.1-9.9 (13.1) cm long, (1.7) 2.3-5.1 (5.5) cm wide, very slightly curved abaxially; apex acuminate, rarely acute or obtuse; base cuneate or slightly decurrent, less commonly acute or obtuse; margin plane or often slightly revolute near base, minutely serrate on distal ca 3/4; venation acrodromous, suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 0.5-5.5 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein, largest secondary veins, and tertiary veins strongly impressed when fresh, but flattening upon drying; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins

less raised, the quaternary and higher order veins usually slightly raised in dried material, the surface essentially glabrous, but with some scattered minute glandular hairs present; marsupiform domatia and persistent tufts of hairs absent on abaxial surface in axils at junction of midvein and largest secondary veins. Petiole 5-21 (28) mm long, glabrous. Inflorescences borne in leaf axils and on leafless nodes below leaves, 1-3 branched, (1.3) 1.5-4 (6) cm long, (0.4) 0.6-3 (4) cm wide, the caducous bracts to ca 1.9 mm long; peduncle (2) 4-13 (15) mm long. Hypanthium slightly obconical or subglobose, 1.2-1.6 mm long, 1-1.5 mm wide, sparsely pubescent with minute glandular hairs, the portion free from ovary ca 0.6 mm long; portion of calyx bearing external teeth 0.2-0.4 mm long. Calyx teeth ca 0.2 x 0.2 mm. Calyptra conspicuous in bud, the caducous apiculum ca 0.1 mm long. Petals white, obovate, 1.2-1.6 mm long, 1.2-1.4 mm wide, slightly cupped adaxially, spreading; apex rounded, emarginate. Stamens white; proximal segment 1.2-1.4 mm long, narrowly ovate, ca 0.4 mm wide; distal segment narrowly obovate, 1.2-1.4 mm long, ca 0.35 mm wide, the anther sacs 0.4-0.6 mm long, opening confluently by a single, gaping, 2-chambered, apical foramen formed from 2 lateral slits, the septum torn, the bifid outer face of anther longer than or equal in length to the inner face. Ovary inferior, 0.7-1.1 mm long, 1-1.2 mm wide, the apical appendage ca 0.4 mm high; style white, straight or slightly curved, 2.5-3 mm long, ca 0.3 mm in diameter, stigma 0.3-0.4

mm wide. Berries ca 3.5 x 4 mm, purple-black, glabrous or with a few minute glandular hairs; seeds ca 0.7 x 0.4 mm. Fig. 32.

Phenology. Mecranium ovatum apparently flowers from late February to May with most of the fruits reaching maturity by June.

Distribution and Habitat. Hispaniola (Fig. 33): endemic to broad-leaved cloud forests of the Sierra de Baoruco of the Dominican Republic; 800-1750 m, most commonly found at elevations of 1300-1450 m.

The classical locality of collection for this species is known by botanists as "Monteada Nueva." These cloud forests east of the town of Polo are rich with plant species endemic to the Sierra de Baoruco, e.g., Magnolia hamori R. A. Howard (Howard 1948) and Sagraea sp. nov. (Judd & Proctor, pers. comm.).

ADDITIONAL SPECIMENS EXAMINED: DOMINICAN REPUBLIC (all from the Sierra de Baoruco). BARAHONA: vicinity of Paradis, sea level to 800 m, Abbott 1656 (G, US); near Barahona, Fuertes 1589b (A); Monteada Nueva, S of Cabral, near Polo (ca 7 km from the Cabral-Polo highway, on the road to the entrance of Cortico and El Gajo, 18°07.5'N, 71°13.5'W), 1300 m, Judd 1083 (A); ibid., 1400-1425 m, Judd 5182 (A, BR, F, FLAS, JBSD, MO, NY, P, UC, US); ibid., 1380 m, Judd 5184 (FLAS, JBSD, NY, US); ibid., 1300 m, Liogier 11638 (P, US); ibid., Liogier 11651 (US, NY); ibid., Liogier 14283 (US);

Fig. 32. Mecranium ovatum (Skean 1810 unless otherwise indicated). A. Habit (Zanoni et al 30122). B. Leaf, adaxial surface. C. Leaf, abaxial surface (Skean 1812). D. Detail of raised veinlets on leaf abaxial surface. E. Flower. F. Stamen. G. Anther sacs, abaxial view. H. Anther sacs, adaxial view. I. Fruit.

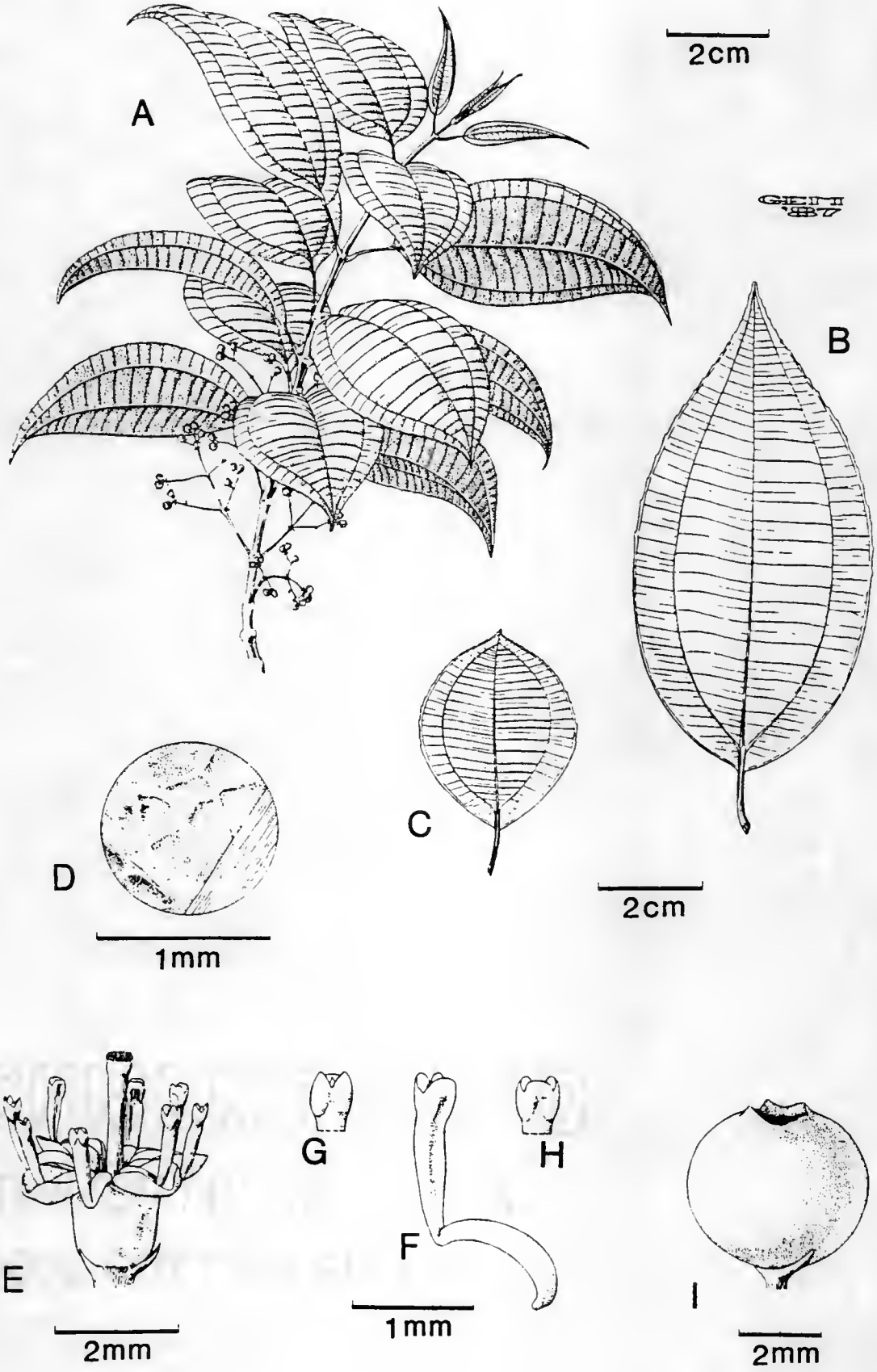
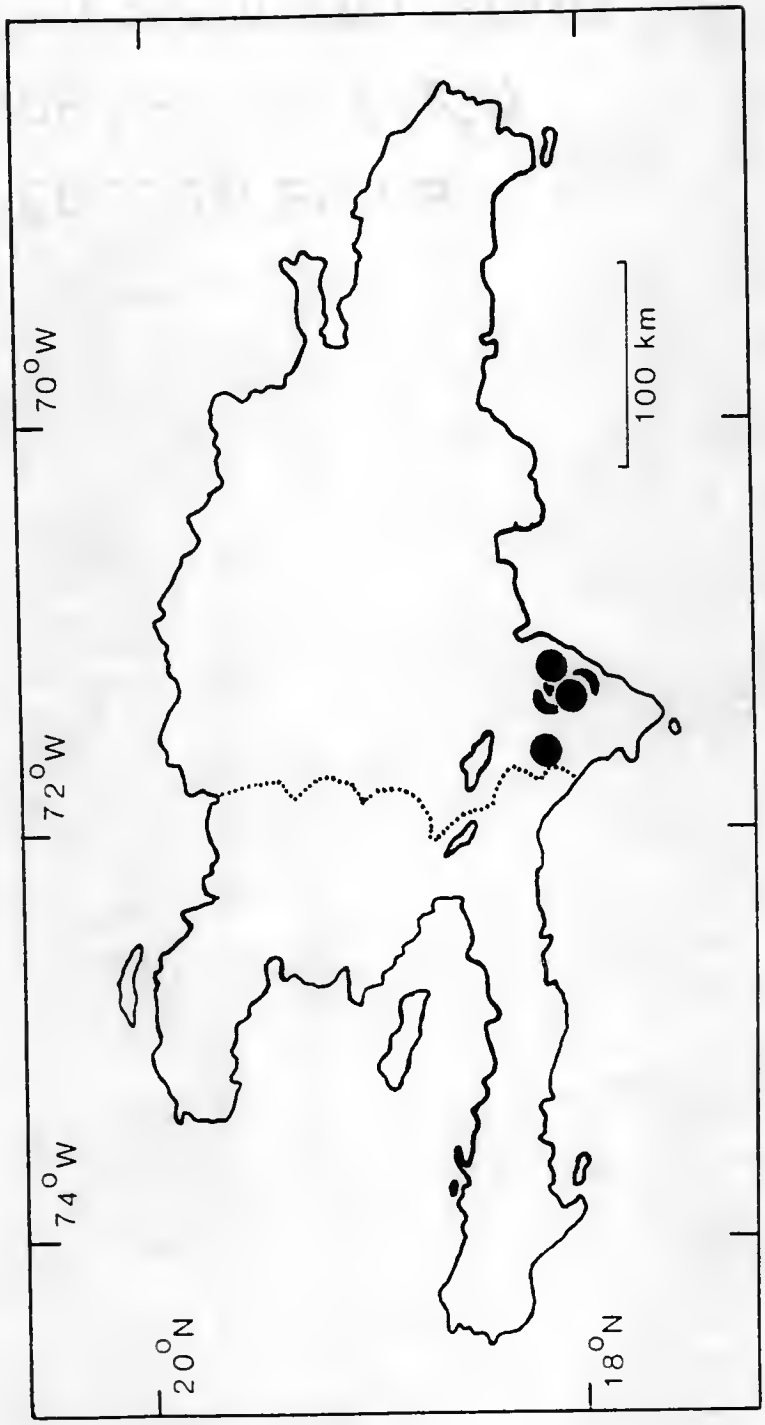

A
2cm
B
C
D
1mm
2cm
E
2mm
G
F
H
1mm
I
2mm

Fig. 33. Distribution of Mecranium ovatum.


70°W
72°W
74°W
20°N
18°N
100 km

ibid., Lomas la Trocha de Pey, above Monteada Nueva, ca 1400 m, Proctor 39084 (JBSD); Monteada Neuva, 1400-1425 m, Skean 1809 (FLAS, JBSD, NY, US); ibid, Skean 1810 (BR, F, FLAS, G, JBSD, MO, NY, S, US); ibid., Skean 1811 (FLAS, JBSD, US); ibid., Skean 1812 (BM, FLAS, G, IJ, JBSD, NY, P, S, US); ibid., Skean 1813 (FLAS, JBSD, US); ibid., Skean 1814 (DUKE, FLAS, GOET, JBSD, K, NY, US); ibid., Skean 1815 (BM, FLAS, G, JBSD, NY, US); ibid., Skean 1816 (FLAS, JBSD); Monteada Nueva, 1250-1280 m, Zanoni et al. 18923 (FLAS, JBSD); ibid., 1280-1340 m, Zanoni et al. 19018 (FLAS, JBSD); 10 km from La Cienaga on the road to Aguita Blanca and El Platon (= crossroads of Charco Blanco-Majogualiti-Aguita Blanca), 18°03'N, 71°09.5'W, at the crest, 1000 m, Zanoni et al. 30122 (FLAS, JBSD); ibid., Zanoni et al. 30155 (FLAS, JBSD).--INDEPENDENCIA: 23.5 km to the "south" of Puerto Escondido on the road over the mountains to Aceitillar, 18°10'N, 71°30'W, 1750 m, Zanoni et al. 33815 (JBSD).

Mecranium ovatum is a distinctive species typically having broadly ovate or elliptic leaves with impressed veins and relatively glabrous stems. Unfortunately, the strongly impressed veins are often not easily observable in dried herbarium material. This species may be most easily confused with M. puberulum, a taxon endemic to the Cordillera Central-Massif du Nord of Hispaniola with densely pubescent young twigs.

Mecranium ovatum is linked rather tenuously in the cladistic analyses with M. virgatum, a Jamaican species that shares the apomorphy of completely glabrous vein axils on the abaxial leaf surface. In my opinion, it is likely that the absence of these hairs is due to homoplasy. From stamen morphology it appears that M. ovatum is a member of the Mecranium multiflorum complex. The geographical distribution of M. ovatum, occurring just to the east of the range of M. multiflorum in the Massif de la Selle-Sierra de Baoruco, makes it tempting to speculate that this species originated as a peripheral isolate of M. multiflorum.

8. Mecranium virgatum (Sw.) Triana, Trans. Linn. Soc. 28: 140. 1871. Melastoma virgata Sw., Nov. gen. & sp. pl., Prod. 72. 1788. Sagraea virgata (Sw.) Macfad. in Fl. Jamaica 2: 52. 1850. Cremanium virgatum (Sw.) Griseb., Fl. Brit. W. Ind. 261. 1860.--TYPE: JAMAICA. Mountain woods, without specific locality, fl, without date [1785 or 1786], Swartz s.n. (lectotype, here designated: S!; isolectotypes: BR!, S!).

Shrub or small tree to ca 7 m tall. Twigs slightly to moderately 4-angled, 2-3 mm in diameter, smooth, essentially glabrous, but youngest buds and nodal ridges often with a few unbranched to irregularly branched and matted multicellular hairs; internodes 0.9-3.8 cm long. Leaf blade coriaceous, ovate to elliptic, 6-18.3 cm long, 1.7-5.5 cm

wide, often plicate if plant in full sun; apex acuminate; base cuneate or slightly decurrent, less commonly acute; very obscurely serrate in distal ca 3/4 to nearly entire, flat or slightly revolute, especially near base; venation usually suprabasal, with 1 pair of conspicuous secondary veins joining midvein 1-11 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat or not visible; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins often slightly raised, the surface essentially glabrous, but with some scattered minute, glandular hairs; marsupiform domatia and persistent axillary hair tufts absent from abaxial surface at junction of midvein and largest secondary veins. Petiole 7-29 mm long, glabrous. Inflorescences borne almost exclusively on leafless nodes below leaves and on old wood, 1.4-5.5 cm long, 0.5-4.6 cm wide, 1-2 branched; peduncle 3-17 mm long. Hypanthium narrowly obconical, 2.8-4.4 mm long, 1.5-2.9 mm wide, base prolonged into a "pedicel" 0.3-1.1 mm long, very sparsely pubescent with minute glandular hairs, the portion free from ovary 0.4-2.3 mm long; portion of calyx bearing external teeth 0.3-0.7 mm long. Calyx teeth ca 0.2 x 0.2 mm. Calyptra conspicuous in bud, the caducous apiculum ca 0.1 mm

long. Petals white, obovate, 2.9-5.2 mm long, 2.7-5.8 mm wide, slightly cupped adaxially, reflexed; apex rounded, emarginate. Stamens white; proximal segment narrowly ovate, 3-5.7 mm long, 0.3-0.6 mm wide; distal segment narrowly obovate, 2.2-3.4 mm long, 0.4-0.5 mm wide, the anther sacs 1.1-1.8 mm long, opening by a gaping foramen, septum torn. Ovary inferior, ca 2.7-3.2 mm long, 1.4-2.3 mm wide, the apical appendage 0.8-1.3 mm high; style white, straight or often strongly curved, 5.8-9.9 mm long, 0.4-0.6 mm wide; stigma 0.4-0.7 mm wide, slightly expanded. Berries 7-9 x 5-7 mm, purple-black, glabrous or with a few minute glandular hairs; seeds 5-7 x 3-4 mm. Fig. 34.

Phenology. Mecranium virgatum flowers from late January through April and produces mature fruits by August, occasionally with mature fruits produced as early as May.

Distribution and Habitat. Jamaica (Fig. 35): hardwood forests on limestone and low-elevation cloud forests on the eastern half of the island; 60-1370 m.

ADDITIONAL SPECIMENS EXAMINED. JAMAICA. CLARENDON: Mason River Savanna, 2.75-3 mi NW of Kellits P. O., ca 2300 ft [701 m], Proctor 16234 (IJ); stream gully 0.9 mi by road E of Reckford, ca 2000 ft [610 m], Proctor 38107 (IJ).-- PORTLAND: Blue Mtns., path to Moodie's Gap, 4000 ft [1220 m], Adams 7824 (UCWI); ibid., Lawrence Bottom, 950 ft [290 m], Adams 7914 (UCWI); John Crow Mtns., SE foothills, 350 m, Britton 3996 (NY); John Crow Mtns., SE foothills, Harris &

Fig. 34. Mecranium virgatum. A. Habit (Skean 1916). B. Leaf, abaxial surface (Skean 1902). C. Leaf, adaxial surface (Skean 1867). D. Stamen (Weaver 1788, DUKE). E. Stamen apex, abaxial face (Weaver 1788). F. Stamen apex, adaxial face (Weaver 1788). G. Flower, note elongate hypanthium base (Weaver 1788). H. Fruit (Judd 5442).

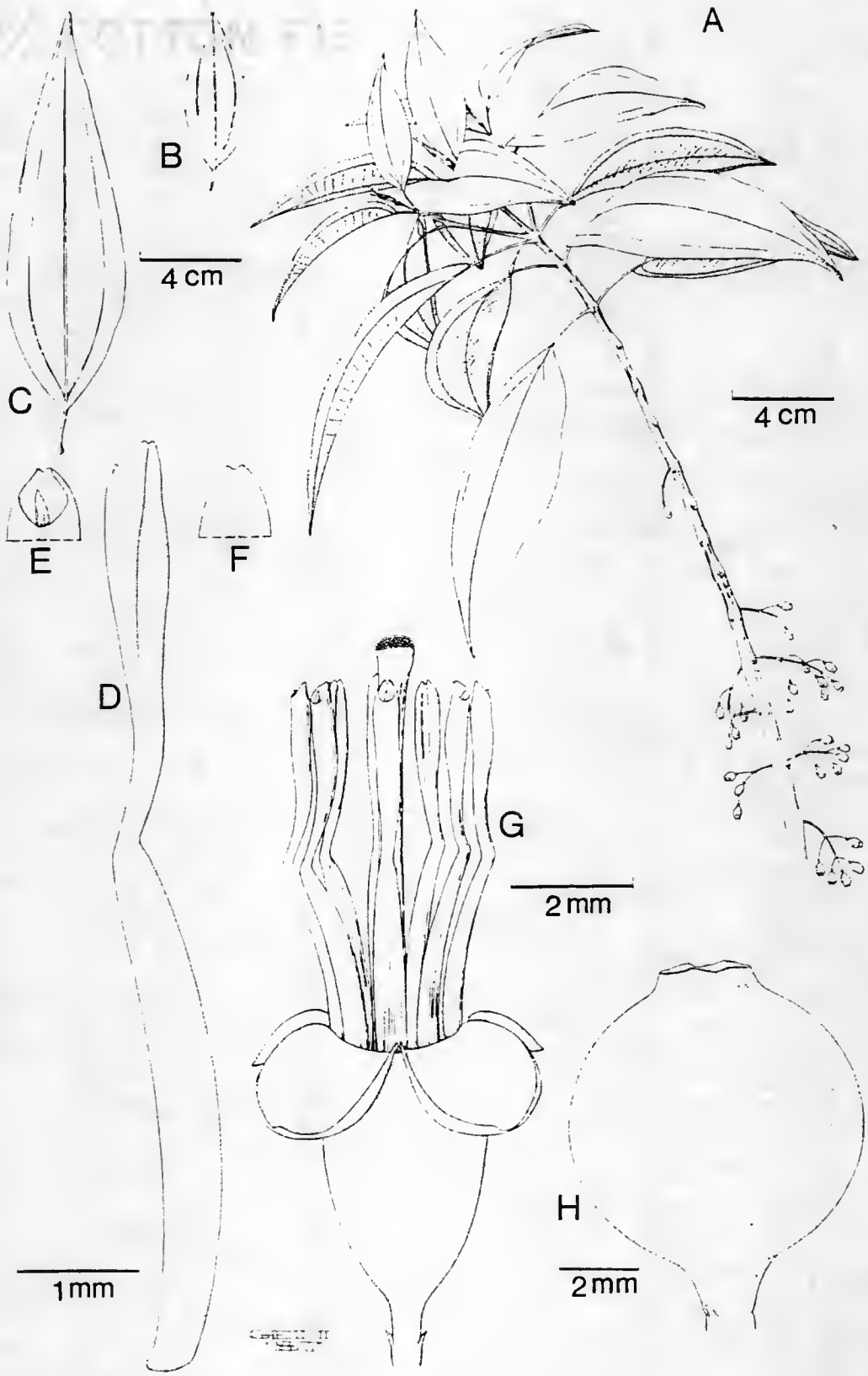
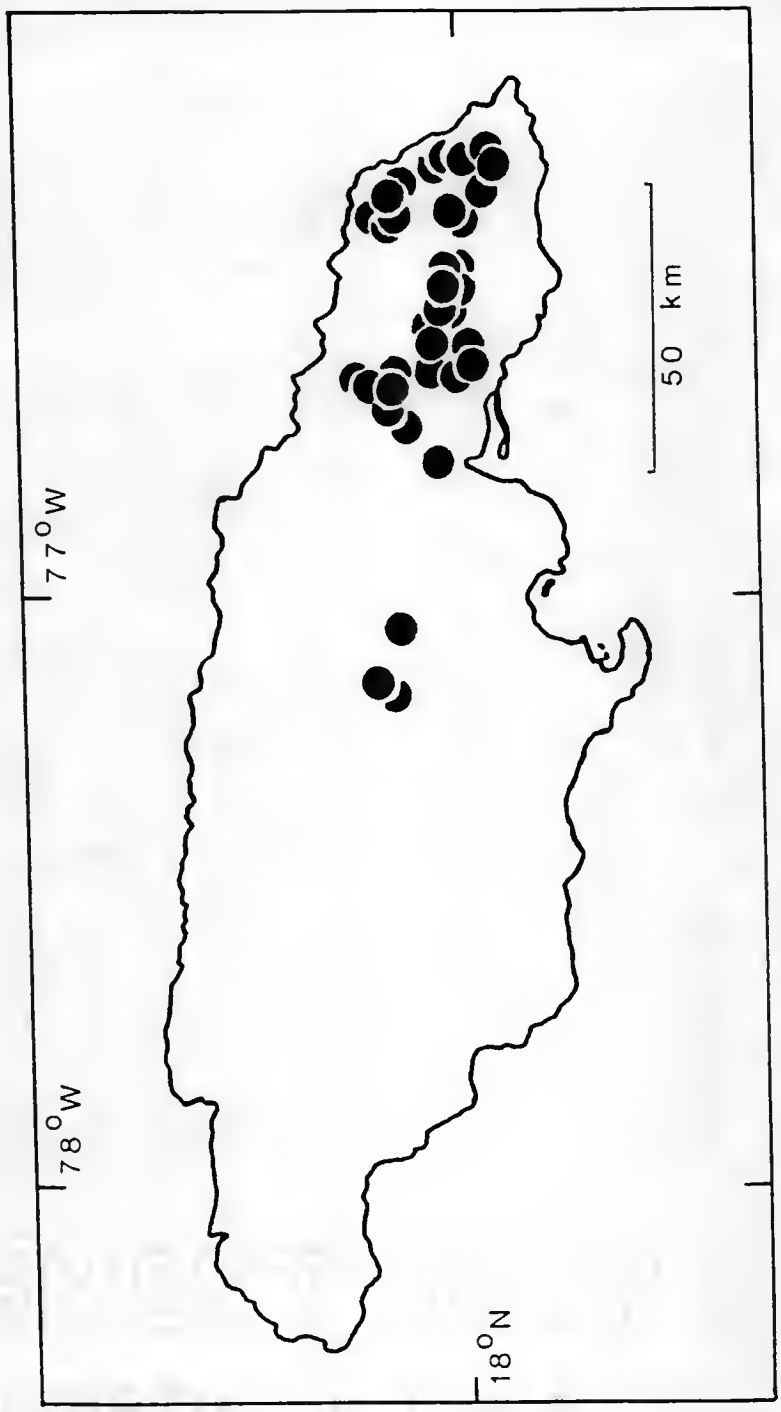

A
B
4 cm
C
4 cm
E
F
D
G
2 mm
1 mm
H
2 mm

Fig. 35. Distribution of Mecranium virgatum.


77°W
78°W
18°N
50 km

Britton 10684 (F, NY, US); Port Antonio, Dec 1850, Hitchcock s.n. (MO); Blue Mtns., Hardwar Gap, along "Waterfall Trail" & Oatley Rd., 1190-1250 m, Judd 5425 (FLAS, IJ); W foothills of John Crow Mtns., vicinity of Moore Town, ca 80 m, Judd 5442 (FLAS, IJ, NY, S); Blue Mtns., 3.6 mi S of Wakefield on road to Hardwar Gap, ca 750 m, Judd 5464 (FLAS, IJ, NY, S); W foothills of John Crow Mtns., 1.4 mi S of Seamans Valley on road to Moore Town, ca 70 m, Judd 5515 (FLAS, IJ); Blue Mtns., vicinity of Millbank, 200-300 m, Maxon & Killip 128 (NY, US); Water Works Glen, Port Antonio, Normon 233 (BM); John Crow Mtns., 5 mi SW of Priestman's River, ca 1500 ft [457 m], Proctor 7617 (IJ, NY); Port Royal Mtns., along road between Whitehall & Big Hill, 1000-3000 ft [305-915 m], Proctor 7681 (IJ, NY); John Crow Mtns., NW slope of Joe Hill, 1750-2250 ft [534-686 m], Proctor 11556 (IJ); ibid., 1 mi S of Fellowship, ca 200 ft [61 m], Proctor 20639 (A, IJ, NY); foothills of John Crow Mtns., along Ecclesdown Rd. ca 1 mi N of Ecclesdown, 280 m, Skean 1867 (FLAS, IJ, NY, US); Blue Mtns., along road ca 0.5 mi N of Hardwar Gap, 1225 m, Skean 1902 (A, FLAS, IJ, NY, S, US); Blue Mtns., Haycock Hill, Skelding & Adams 22443 (M); John Crow Mtns., ca 1.3 mi SW of Ecclesdown, 1500-2000 ft [457-610 m], Webster 5566 (A, BM, IJ, S, US); ravine and track floodplain of Rio Grande, near Millbank, SW of Portland, West & Arnold 183 (FLAS).--ST. ANDREW (Blue Mtns., including Port Royal Mtns.): Mt. Horeb, 4250 ft [1296 m], Adams 6234 (BM, DUKE); Plantain River, 1700 ft [518 m], Adams 9017 (M, UCWI); Hermitage Dam,

1750 ft [534 m], 8 Jan 1944, Barry s.n. (IJ); near Clydesdale, E. G. Britton 3814 (NY); slopes at Curea Curea Gap, Britton 4057 (NY); hillside below Hardware [Hardwar] Gap, Britton & Hollick 1807 (NY); along road between Newcastle & Hardwar Gap, ca 3700 ft [1130 m], 2 Feb 1968, Cornman s.n. (IJ); along road from Kingston to Newcastle, in Irish Town, ca 2400 ft [732 m], Crosby et al. 228A (DUKE); Bellevue, 4500 ft [1372 m], Eggers 3766 (BR, E, G, US); Brandon Hill, 1000 ft [305 m], Fawcett 8061 (F, NY); near Hardwar Gap, Gillis 8998 (MO); Cinchona, leeward slopes, Harris & Lawrence C15301 (NY); mountains near Kingston, 1897, Hausen s.n. (NY); 2.8 mi N of Irish Town on road to Newcastle, ravine at Marston-Daniels Hydroelectric Plant to ca 50 m up highway, ca 850 m, Judd 5344 (FLAS, IJ); ibid., Judd 5345 (A, BR, FLAS, G, IJ, JBSD, NY, S, US); 0.4 mi S of Newcastle on road to Irishtown & Kingston, ca 1020 m, Judd 5351 (FLAS, IJ, NY); Mt. Airy, along the trail, Maxon 854 (NY, US); Mt. James & vicinity, ca 450 m, Maxon 8596 (S, US); Port Royal Mtns., Flamstead & vicinity, 1000-1100 m, Maxon 8708 (S, US); Latimer Rd., Cinchona, Feb 1892, Nichols s.n. (NY); Pleasant Hill, 3660 ft [1116 m], Perkins 1218 (A, GH); Chester Vale, 3000 ft [915 m], Philipson 952 (BM, MO); near Castleton Garden, 800 ft [244 m], 19 Feb 1903, Rehder s.n. (A); along road near Newcastle, 3500 ft [1067 m], Rishbeth s.n. (IJ); corner of Greenwich Rd. with Newcastle Rd., 4000 ft [1220 m], Robertson 5522 (UCWI); Mt. Horeb, along Fairey Glade trail 200-300 m above jct. with paved

road at Hardwar Gap, 1220-1240 m, Skean 1898 (A, FLAS, IJ, JBSD, NY, S, US); ibid., Skean 1913 (A, BM, BR, FLAS, G, IJ, JBSD, NY, S, US); ibid., Skean 1914 (A, FLAS, IJ, JBSD, NY, S, US); along Mammie River Rd. near the Marston-Daniels Mini Hydroelectric & Water Supply, 880 m, Skean 1915 (FLAS, IJ, NY S); ibid., 895 m, Skean 1916 (A, BM, BR, FLAS, G, IJ, JBSD, MO, NY, S, US); Brandon Hill, 1000 ft [305 m], Thompson 8061 (NY); Hardwar Gap, 4000 ft [1220 m], Yuncker 18493 (G, S).--ST. ANN: County of Middlesex, 2000 ft [610 m], Hunnewell 11037 (GH);--ST. CATHERINE: Red Hills, Coopers Hill, 2250-2500 [686-762 m], Proctor 8477 (IJ); along road between Point Hill & Juan de Bolas Peak, 2000-2700 ft [610-823 m], Yuncker 18358 (BM, F, G, MO, S).--ST. THOMAS (Blue Mtns. unless indicated): level ridge W of Winchester Peak, 1600 ft [488 m], Anderson & Sternberg 3343 (DUKE, GH); along trail between Farm Hill and Abbey Green, 4000 ft [1220 m], 29 Jul 1946, Barry s.n. (IJ); near Portland Gap, 5000 ft [1525 m], 17 Apr 1948, Bengry s.n. (IJ); fields and hedges around Whitfield Hall, ca 4200 ft [1280 m], Burch & Proctor 7159 (DUKE, MO, NY); 1 mi from Whitfield Hall, 4300 ft [1311 m], duQuesnay 282 (UCWI); Cuna Cuna Pass, 2800 ft [854 m], Farr 1576 (IJ, US); Abbey Green, 4000 ft [1220 m], Harris 6274 (NY); just E of Whitfield Hall in ravine (W fork of Negro River) along trail from Whitfield Hall to Abbey Green, 1200-1300 m, Judd 5366 (A, FLAS, G, IJ, NY, S, US); Farm Hill, Orcutt 3480 (UC, US); Big Level area, SE end of John Crow Mtns., 1500-2000 ft [457-610], Proctor 11794 (IJ);

ibid., 1500-1850 ft [457-564 m], Proctor 26755 (IJ); above Abbey Green, 1600 m, 16 May 1906, Shreve s.n. (NY); trail from Whitfield Hall to Blue Mtn. Peak, ca 1 mi from Whitfield Hall, 1360 m, Skean 1918 (A, FLAS, G, IJ, JBSD, NY, S, US); Farm Hill Plantation, 25 Jun 1926, Skutch s.n. (F); John Crow Mtns., along trail from vicinity of Beacon Hill to Corn Puss Gap, Weaver 1788 (DUKE); John Crow Mtns., near Corn Puss Gap, ca 1800 ft [549 m], Yuncker 18097 (BM, F, S). WITHOUT SPECIFIC LOCALITY. JAMAICA: without date, Anon. (GH); without date, Anon. (G); without date, Macfadyen s.n. (E, K, NY); 1857, Marsh 379 (GOET); Marsh 1388 (A(photo), BR, GOET, IJ(photo)); without date, Shakespear s.n. (BM); without date, Wiles s.n. (G).

Mecranium virgatum is a distinctive, essentially glabrous, species with comparatively large white flowers borne more or less exclusively on leafless nodes and old wood below the leaves. Only one collection examined (Adams 7914; UCWI) had flowers borne in the axils of leaves. The hypanthium bases and fruit bases of this species are unique in the genus because they are prolonged like pedicels (Fig. 34G-H.). The other species of Mecranium have rounded hypanthium bases.

As discussed previously, M. virgatum shares the apomorphy of glabrous vein axils with M. ovatum, a species endemic to the Sierra de Baoruco of Hispaniola. This weak character, which also occurs in M. axillare subsp.

urbanianum and M. integrifolium subsp. alainii, may have arisen independently in M. ovatum and M. virgatum. Mecranium virgatum is easily distinguished from the other two species of the genus occurring on Jamaica (see Appendix C).

This is probably the only species of Mecranium that has been analyzed chemically (Gibbs 1974). George R. Proctor collected specimens for studies of antitumor agents, but no significant activity was reported (Proctor, pers. comm.).

Proctor (1972) reported that this species had white fruits. They are often very light green when immature, but mature to a deep purple-black color, like those of other species in the genus.

9. Mecranium tricostatum Urban & E. Ekman in Urban, Ark. Bot. 22A(17): 53. 1929.--TYPE: HAITI. Dépt. du Sud: Massif de la Hotte, western group, near Torbec, steep slope of Morne Formon, stony place, 1800 m, sterile, 30 Dec 1926, Ekman H7464 (lectotype, designated here, sterile material on sheet: S!; isolectotypes: A!, G!, IJ!, US).

Shrub or small tree to ca 4.5 m tall. Twigs slightly to moderately 4-angled, 1-2 mm in diameter, smooth, essentially glabrous or with unbranched to irregularly branched and matted multicellular hairs in internodal grooves, youngest buds and nodal ridges often with a few

such hairs; internodes 0.5-1.6 cm long. Leaf blade coriaceous, elliptic or obovate, less commonly narrowly ovate, 1.3-2.8 cm long, 1.1-2 cm wide; sprout leaves and sucker-shoots with internodes to 3.3 cm long and leaves with blades to 3.8 x 2.6 cm; apex short-acuminate or rounded to retuse; base obtuse or rounded, less commonly broadly cuneate; margin obscurely serrate in distal ca 1/2, usually flat except strongly revolute base forming basal pseudodomatia; venation ± basal, usually with 1 pair of conspicuous secondary veins joining midvein 0-1 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or slightly raised, the quaternary and higher order veins usually raised, the surface essentially glabrous, but with some scattered minute, glandular hairs; persistent axillary hair tufts absent. Petiole 2.5-6 mm long, glabrous or with a few hairs on edges of sulcus; petioles of sprouts sucker-shoots to 9 mm long. Inflorescences borne in leaf axils and on leafless nodes below leaves, 1.4-3.4 cm long, 0.5-2.1 cm wide, 1-2 branched; peduncle 5-13 mm long. Hypanthium broadly urceolate or subglobose, ca 1.7 mm long, 1.9-2.2 mm wide, sparsely pubescent with minute glandular hairs, the portion

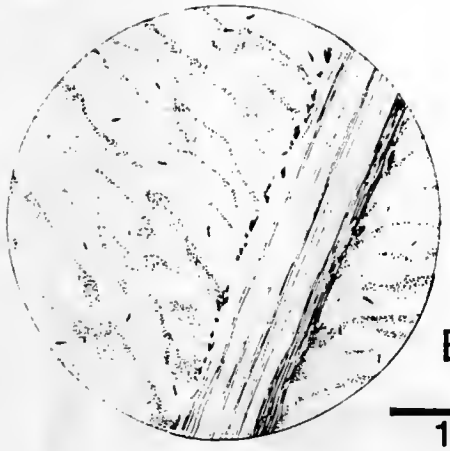
free from ovary ca 0.7 mm long; portion of calyx bearing external teeth ca 0.3 mm long. Calyx teeth ca 0.2 x 0.2 mm. Calyptra conspicuous in bud, the caducous apiculum ca 0.1 mm long. Petals white, obovate, 1.8-2 mm long, 1.1-1.3 mm wide, slightly cupped adaxially, spreading; apex rounded, emarginate. Stamens white; proximal segment narrowly ovate, 1.4-1.8 mm long, 0.3-0.5 mm wide; distal segment narrowly obovate, 1.3-1.7 mm long, 0.3-0.5 mm wide, the anther sacs 0.4-0.5 mm long, opening by a single gaping foramen, septum torn. Ovary inferior, ca 1.1 mm long, 1.2-1.4 mm wide, the apical appendage ca 0.5 mm high; style white, straight or slightly curved, 2.5-3.5 mm long, ca 0.4 mm wide; stigma ca 0.6 mm wide, expanded. Immature Berries ca 4 x 4 mm, red-purple, glabrous or with a few minute glandular hairs; immature seeds ca 0.7 x 0.5 mm. Fig. 36.

Phenology. This poorly known species probably begins flowering in August and produces mature fruits by February.

Distribution and Habitat. Hispaniola (Fig. 37): endemic to broad-leaved cloud forests in the high elevations of the Massif de la Hotte of Haiti; 1800-2375 m. See Judd (1987) for more information on these interesting forests.

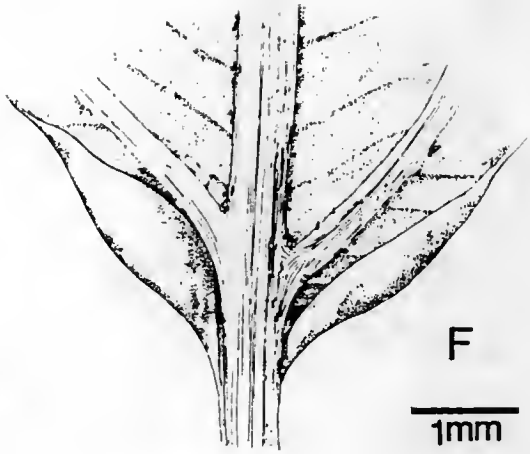
ADDITIONAL SPECIMENS EXAMINED. HAITI. DÉPT. DU SUD: Massif de la Hotte, western group, Les Roseaux, Morne La Hotte [Pic Macaya?], 2375 m [obviously an error, since the highest peak in the range is Pic Macaya, 2347 m], Ekman H10642 (S); ibid., ridge of Morne Formon, 2140-2150 m, Skean

Fig. 36. Mecranium tricostatum (all from Skean 1666a unless indicated otherwise). A. Habit. B. Leaf from sterile shoot, abaxial surface (Ekman 7464). C. Leaf from sucker-shoot growing under low light conditions, abaxial surface (Skean 1667). D. Young flower bud. E. Detail of leaf abaxial surface showing raised veinlets. F. Leaf base, abaxial surface showing "pseudodomatia" formed by revolute margin.



E

1mm



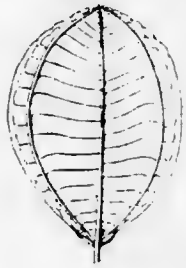
F

1mm

A 2cm

B

2cm

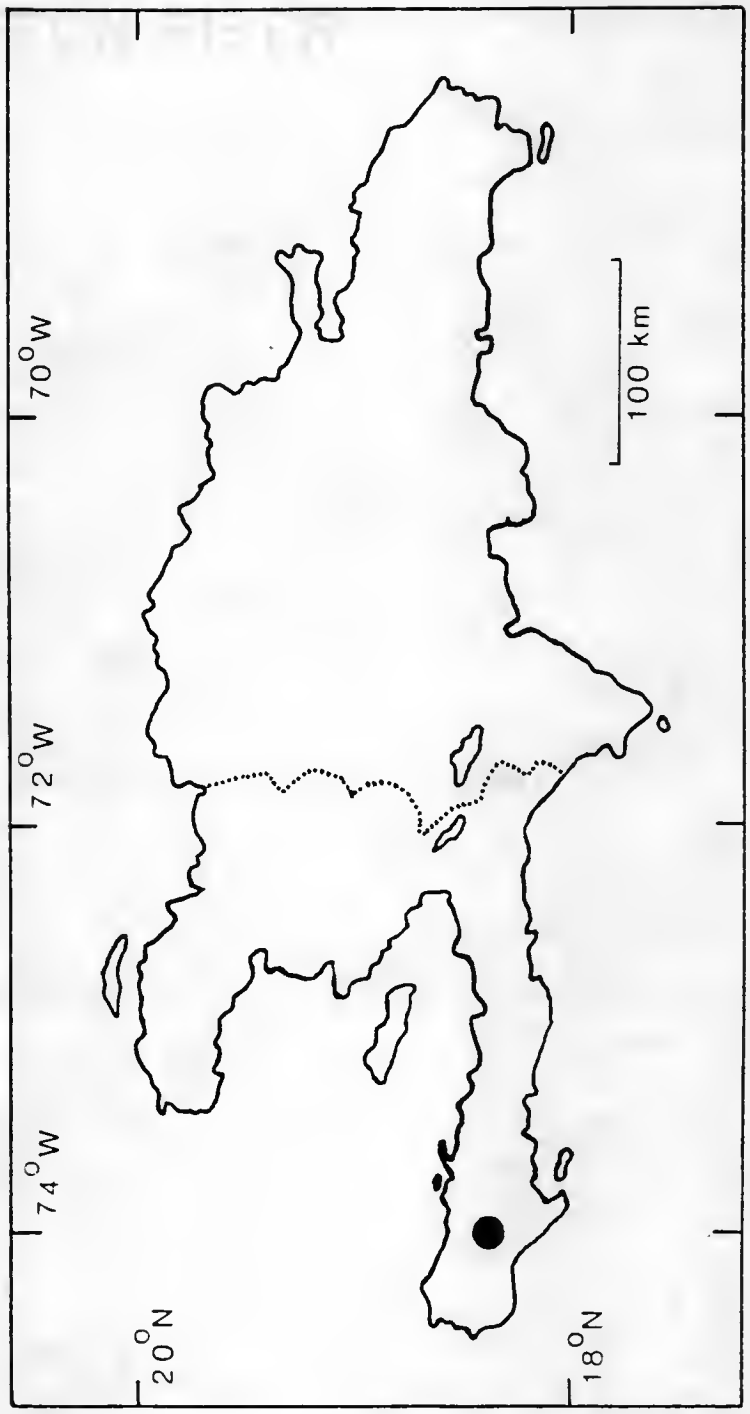


C

D

2mm

Fig. 37. Distributions of *Mecranium tricostatum*, *M. alpestre*, and *M. revolutum*.


74°W
72°W
70°W
20°N
18°N
100 km

1666A (A, BM, BR, DUKE, E, F, FLAS, G, GOET, IJ, JBSD, L, M, MO, NY, P, S, UC, UCWI, US); ibid., Skean 1667 (A, FLAS, NY, S, US); ibid., just W of the campsite near the summit, 2150 m, Skean 2104 (A, BM, BR, F, FLAS, G, IJ, JBSD, NY, P, S, US).

Mecranium tricostatum is a small-leaved, relatively glabrous member of the M. multiflorum complex, s.l. Phenetically, it appears most similar to M. alpestre, a species that occurs sympatrically with it on Morne Formon. The two may be sister species (see discussion under Phylogeny), being linked by the synapomorphy of small leaves. The latter is much more densely pubescent and generally has ovate leaves. Plants of M. alpestre sometimes exhibit well developed pseudodomatia, but not as commonly as in M. tricostatum.

Mecranium tricostatum is also similar to M. revolutum, a species of slightly lower elevations in the Massif de la Hotte. The latter has larger leaves and lacks the abaxially raised veinlets and well developed pseudodomatia of M. tricostatum.

Ekman noted on his handwritten label, now attached to the sheet at S, that the type of M. tricostatum was collected in sterile condition. However, in the description of this species, Urban and Ekman (1929) gave measurements for fruits. These measurements were probably taken from fruits of M. alpestre. A fruiting fragment of this species

is attached to the specimen at S. Ekman's two sterile collections of M. tricostatum were the only specimens of this species examined by Urban and Ekman.

For the most part, I have considered the holotypes of Urban and Urban and Ekman names to have been deposited at B and presumably destroyed (see Sleumer 1949). However, since the specimen of M. tricostatum at S includes two discordant elements, I have chosen the sterile portion, which comprises the great majority of the material on the sheet, as the lectotype of M. tricostatum.

10. Mecranium alpestre Urban & E. Ekman in Urban, Ark. Bot. 22A (17): 53. 1929.--TYPE: HAITI. Dépt. du Sud: Massif de la Hotte, western group, near Torbec, top of Morne Formon in shrubby, broad-leaved forest, 2225 m, fr, 1 Jan 1927, Ekman H7476 (holotype B, destroyed; isotypes: EHH!, G!, IJ!, NY!, S!, US!).

Shrub or small tree to ca 3.5 m tall. Twigs slightly to moderately 4-angled, 1-2 mm in diameter, smooth, youngest portions rather uniformly covered with unbranched to irregularly branched and matted, often flattened and scale-like, multicellular hairs; internodes 0.7-1.8 cm long. Leaf blade coriaceous, ovate or elliptic, 1.3-3.8 cm long, 0.8-2.1 cm wide; sprout leaves and sucker-shoots with internodes to 3.4 cm long and leaves with blades to 7.5 x 5.7 cm; apex short-acuminate or acute, less commonly obtuse to rounded or

slightly retuse; base obtuse or rounded; margin obscurely serrate in distal ca 3/4, usually flat except strongly revolute base occasionally forming basal pseudodomatia; venation ± basal, usually with 1 pair of conspicuous secondary veins joining midvein 0-1 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pairs of secondary veins slightly to strongly impressed, the intramarginal secondary veins and tertiary veins flat; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or slightly raised, the quaternary and higher order veins usually slightly raised, the surface pubescent with hairs similar to those on stem concentrated along veins and scattered minute, glandular hairs; persistent axillary hair tufts present. Petiole 2-8 mm long, pubescent like stem; petioles of sprouts and sucker-shoots to 21 mm long. Inflorescences borne in leaf axils and on leafless nodes below leaves, 1-4.5 cm long, 0.8-2.2 cm wide, 1-2 branched; peduncle 6-14 mm long. Immature hypanthium broadly urceolate or subglobose, ca 1.3 mm long, ca 1.7 mm wide, sparsely pubescent with minute glandular hairs, the portion free from ovary ca 0.5 mm long; portion of calyx bearing external teeth ca 0.3 mm long. Immature calyx teeth ca 0.2 x 0.2 mm. Calyptra conspicuous in bud. Immature petals white, obovate, ca 1.3 mm long, ca 1.2 mm wide, slightly cupped adaxially, spreading; apex rounded, emarginate.

Immature folded stamens white; proximal segment narrowly ovate, ca 1.0 mm long, ca 0.5 mm wide; distal segment narrowly obovate, ca 1.2 mm long, ca 0.4 mm wide, the anther sacs ca 0.4 mm long, apparently opening by a single gaping foramen, septum torn. Immature ovary inferior, ca 1.0 mm long, ca 1.2 mm wide, the apical appendage ca 0.3 mm high; immature style white, straight, ca 1.3 mm long, ca 0.3 mm wide; stigma ca 0.6 mm wide, expanded. Immature berries ca 4 x 4 mm, red-purple, glabrous or sparsely pubescent with minute glandular hairs; immature seeds ca 0.8 x 0.4 mm. Fig. 38.

Phenology. Mecranium alpestre has not been collected in flowering condition or with mature fruits. The species probably flowers in mid-Autumn and produces mature fruits by March.

Distribution and Habitat. Hispaniola (Fig. 37): endemic to broad-leaved cloud forests in the high elevations of the Massif de la Hotte of Haiti, where it is known only from the ridge of Morne Formon; 2140-2225 m. See Judd (1987) for detailed species lists and a discussion of the mosaic of cloud forests and pine forests found on Morne Formon.

ADDITIONAL SPECIMENS EXAMINED. HAITI. DÉPT. DU SUD: Massif de la Hotte, ridge of Morne Formon, 2140-2150 m,

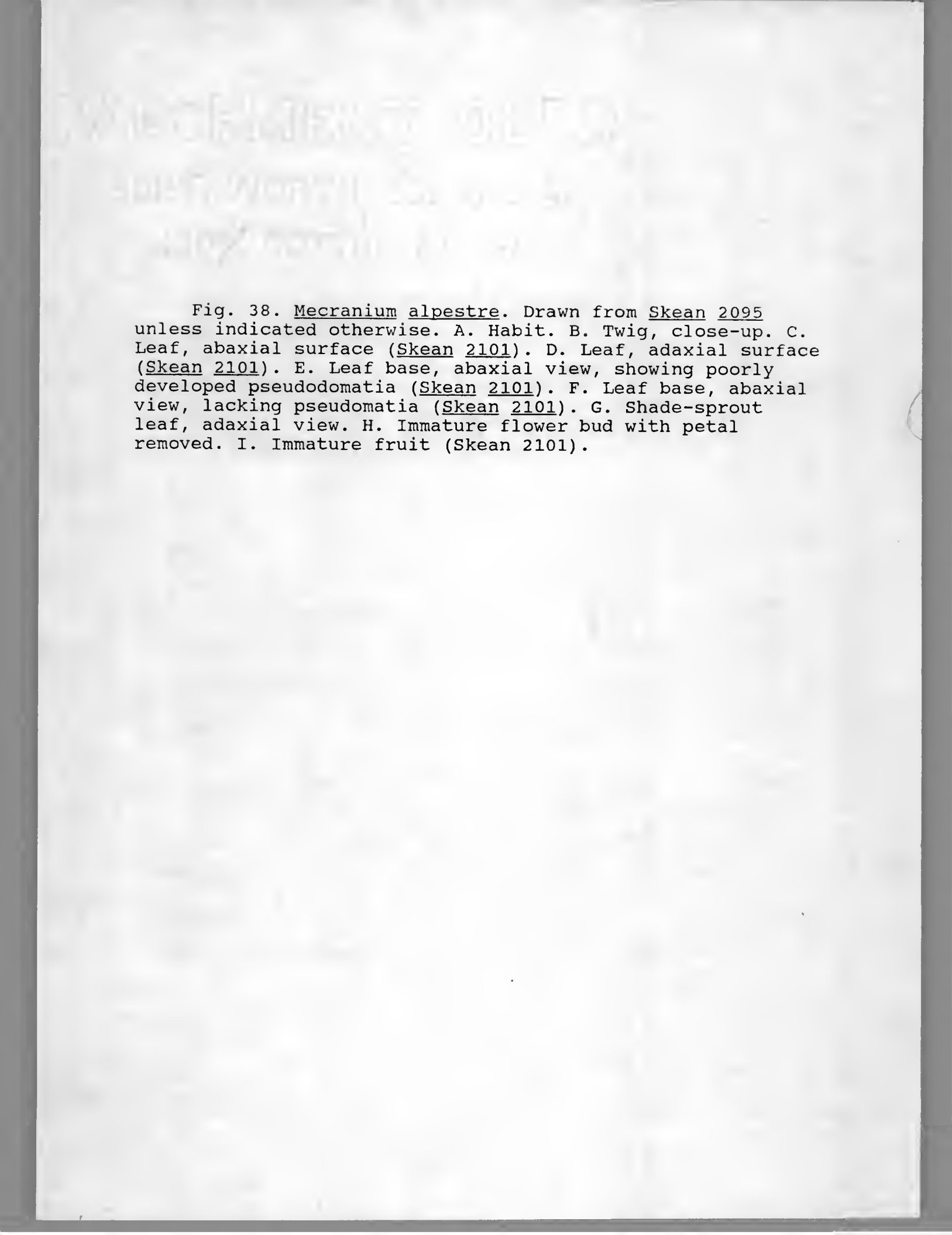
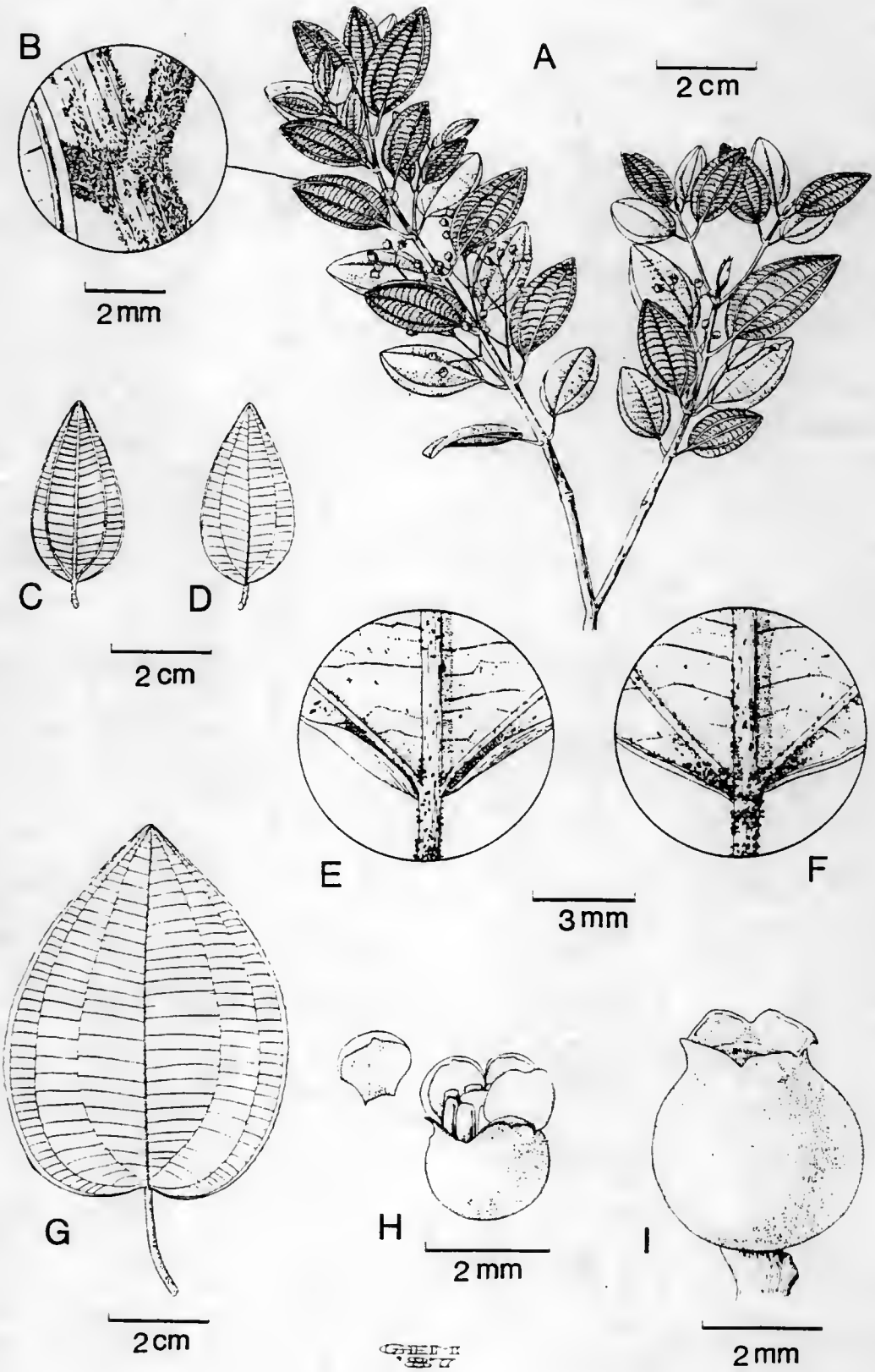


Fig. 38. Mecranium alpestre. Drawn from Skean 2095 unless indicated otherwise. A. Habit. B. Twig, close-up. C. Leaf, abaxial surface (Skean 2101). D. Leaf, adaxial surface (Skean 2101). E. Leaf base, abaxial view, showing poorly developed pseudodomatia (Skean 2101). F. Leaf base, abaxial view, lacking pseudomatia (Skean 2101). G. Shade-sprout leaf, adaxial view. H. Immature flower bud with petal removed. I. Immature fruit (Skean 2101).


B
A
2 cm
2 mm
C
D
2 cm
E
F
3 mm
G
H
2 mm
I
2 cm
2 mm

Skean 2095 (A, BM, BR, F, FLAS, G, IJ, JBSD, MO, NY, P, S, US); ibid., at the campsite near the summit, 2150 m, Skean 2101 (FLAS, NY, S, US).

Mecranium alpestre is a small-leaved pubescent member of the M. multiflorum complex, s.l. Unfortunately, this rare, high-elevation taxon is known only from collections of specimens bearing immature fruits. The description of immature flowers above is based on the examination of a single flower bud collected just before anthesis, which is illustrated in Fig. 38H. From examining young anthers and some withered anthers found in dried material, it appears that the anther sacs dehisce by means of a gaping 2-chambered foramen, as is characteristic of other members of the M. multiflorum complex.

Mecranium alpestre is probably most closely related to M. tricostatum, a much more glabrous species with abaxially raised veinlets and conspicuous psudodomatia located on the leaf bases. Both taxa are sympatric on Morne Formon in Parc National Pic Macaya. I have observed M. tricostatum with flower buds in early July, and with slightly larger immature fruits than M. alpestre in January. It is quite possible that these two species are isolated reproductively by flowering time, with M. tricostatum flowering first.

Mecranium alpestre resembles a small-leaved M. puberulum. The latter species is endemic to the Cordillera Central-Massif du Nord and has anthers with persistent septa between the anther sacs.

A small fruiting branch of M. alpestre is attached to the lectotype of M. tricostatum at S. This is probably the basis for the fruit description in the original description of M. tricostatum (see discussion under the latter species). The specific epithet probably refers to the high elevation habitat of this taxon.

11. Mecranium multiflorum (Desr.) Triana, Trans. Linn. Soc. 28: 139. 1871. Melastoma multiflora Desr. in Lam. & Poiret, Encycl. 4: 35. 1797. Ossaea multiflora (Desr.) DC., Prod. 3: 169. 1828--TYPE: SAINT DOMINGUE [HISPANIOLA]. Without specific locality [probably from the Massif de la Selle of Haiti near Port-au-Prince], without date, [1789], fl, Martin s.n. (holotype P, photos at F!, NY!, US!; isotype: P!).

Shrub or small tree to ca 5 m tall. Twigs slightly to moderately 4-angled, 1.5-3 mm in diameter, smooth, essentially glabrous, but youngest buds and nodal ridges often with a few unbranched to irregularly branched and matted multicellular hairs; internodes 1-4 cm long. Leaf blade ovate, less commonly elliptic or obovate, 4-8.9 (11.9) cm long, 1.3-3.4 cm wide; apex acuminate; base cuneate or slightly decurrent; margin plane or slightly revolute, often strongly so near base forming two basal pseudodomatia, serrate in distal ca 3/4; venation suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 1-7 mm

above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat or not visible, rarely slightly impressed; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins flat, the surface essentially glabrous, but with scattered minute, glandular hairs, and caducous unbranched to irregularly branched and matted multicellular hairs at axils of junction of midvein and conspicuous secondary veins. Petiole 5-17 mm long, essentially glabrous. Inflorescences borne in leaf axils and on leafless nodes below leaves, 1.6-4.4 cm long, 0.4-1.6 cm wide, 1-2 branched, the caducous bracts to ca 1.2 mm long; peduncle 3-10 (18) mm long. Hypanthium slightly obconical or subglobose, 1.3-2.2 mm long, 1.6-1.8 mm wide, very sparsely pubescent with minute glandular hairs, the portion free from ovary 0.6-0.9 mm long; portion of calyx bearing external teeth 0.2-0.3 mm long. Calyx teeth ca 0.3 x 0.3 mm. Calyptra conspicuous in bud, the caducous apiculum to ca 0.2 mm long. Petals white, obovate, 1.3-1.8 mm long, 0.9-1.6 mm wide, slightly cupped adaxially, spreading; apex rounded, emarginate. Stamens white; proximal segment narrowly ovate, 1.3-1.7 mm long, ca 0.4 mm wide; distal segment narrowly obovate, 1.3-1.8 mm long, 0.4-0.7 mm wide,

the anther sacs 0.8-1.2 mm long, usually opening by a single gaping foramen, septum torn. Ovary inferior, 0.9-1.3 mm long, 1-1.4 mm wide, the apical appendage 0.3-0.7 mm high; style white, straight or slightly curved, 2.3-3.4 mm long, ca 0.3-0.4 mm wide; stigma 0.3-0.7 mm wide, capitate. Berries ca 4.5 x 4.5 mm, purple-black, glabrous or with a few minute glandular hairs; seeds 0.7-0.8 x 0.4-0.5 mm. Fig. 39.

Phenology. Flowering primarily from April to June with fruits reaching maturity in August and September.

Habitat and Distribution. Hispaniola (Fig. 40): cloud forests and disturbed areas in the Massif de la Selle and western Sierra de Baoruco. A single population is known from the extreme eastern Massif de la Hotte, near Miragoâne, Haiti; 920-1900 m.

ADDITIONAL SPECIMENS EXAMINED. DOMINICAN REPUBLIC (all from the Sierra de Baoruco). PEDERNALES: Los Arroyos, 4 Jun 1957, Canela s.n. (JBSD); Las Abejas ravine, along trail to Agua Negra, 48 km N of Cabo Rojo, 1150 m, Judd 3018 (FLAS), Loma del Toro, pine forest, 1900 m, Liogier 18171, 18173 (both NY, US); in woods above Los Arroyos, 1800 m, Liogier 23219, (JBSD, NY); ibid., 1600 m, Liogier 23264 (JBSD, NY); Zapotén-El Aguacate, Duvergé, in moist woods, 1300 m, Liogier 27003, 27004 (both JBSD, NY).--HAITI (all from the Massif de la Selle unless stated otherwise). DÉPT. DU GRAND'ANSE: Massif de la Hotte, Morne Rochelois, Miragoâne,

Fig. 39. Mecranium multiflorum. A. Habit (Holdridge 1244). B. Leaf, abaxial surface (Skean 1056). C. Leaf, adaxial surface (Skean 1055). D. Flower bud (Skean 1056). E. Flower (Skean 1056). F. Hypanthium dissection, longitudinal view showing ovary apical appendage, androecial fringe (Skean 1056). G. Stamen (Skean 1056). H. Fruit (Ekman H1273). I. Seed (Ekman H1273).

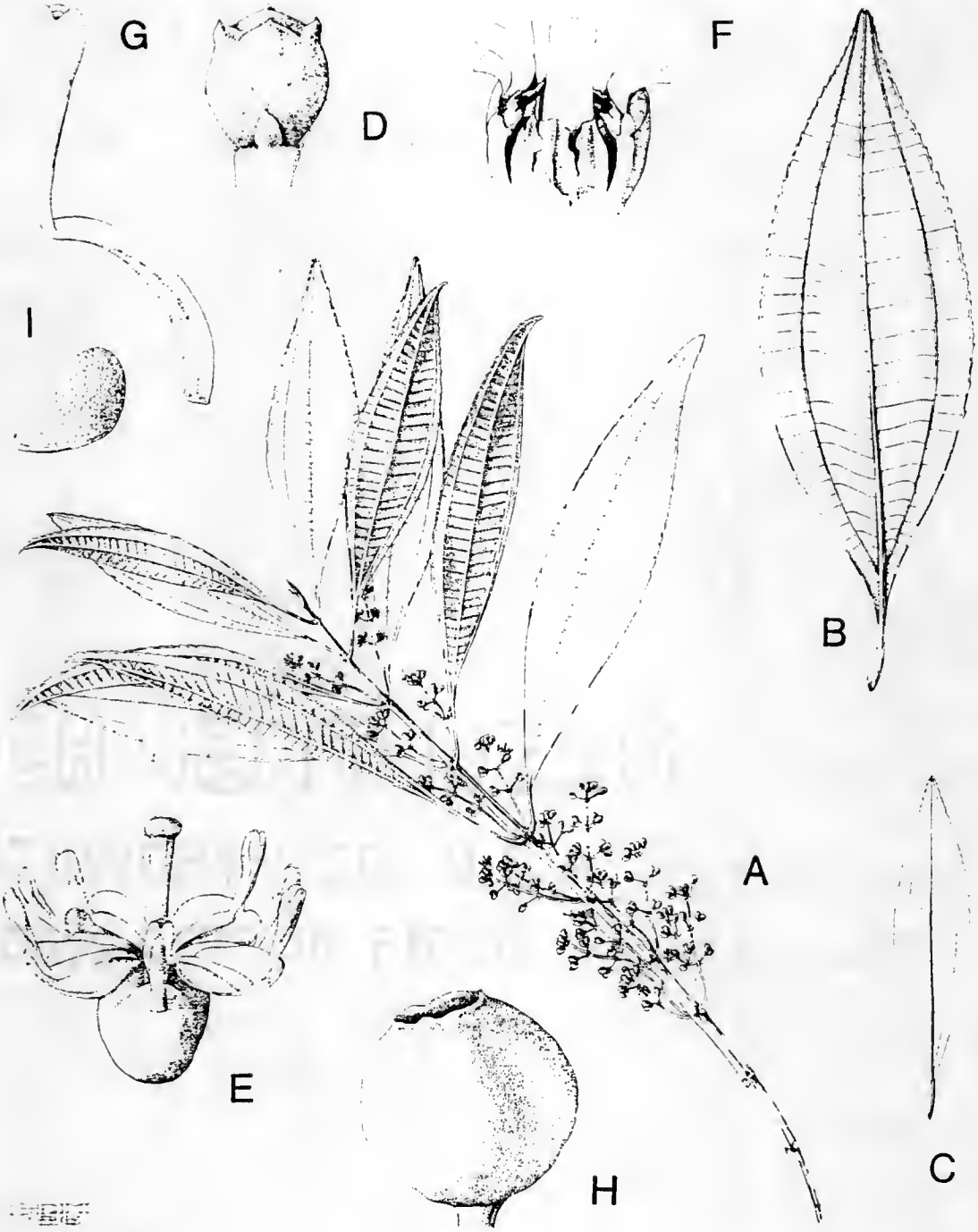
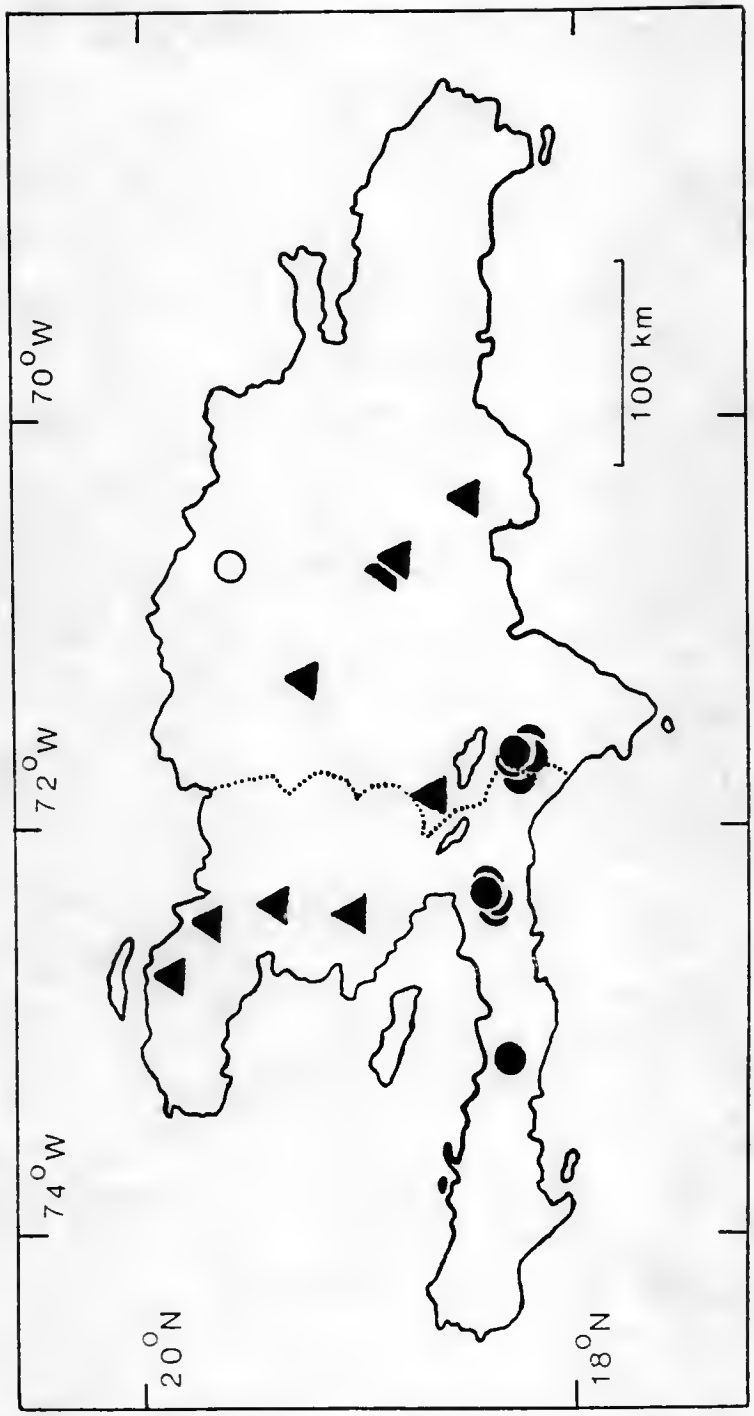

G
D
F
I
B
A
C
E
H

Fig. 40. Distribution of Mecranium multiflorum (dots), M. integrifolium subsp. neibense (triangles), and M. septentrionale (open circle).


70°W
72°W
74°W
20°N
18°N
100 km

in limestone crags near Quatre-Chemins, ca 980 m, Ekman H7933 (G, GH, IJ, NY, S, US); Massif de la Hotte, above Miragoane at Mushotte near the old Alcoa mine, disturbed rak bwa, 920 m, Skean 2067 (A, BR, FLAS, G, NY, S, US). DÉPT. DU OUEST: Kenscoff, Morne Tranchant, on the limestone cap E of the road, Tête-Bois-Pin, 1700 m, Ekman H1273 (G, S, US); Mornes des Commissaires, Gros Cheval, 1500 m, Holdridge 1244 (BM, F, GH, MO, NY, US); above Kenscoff, extremely disturbed cloud forest 0.5 km above L'ecol St. Nicholas along the road to Morne Tranchant (=Morne Teleco), 1640 m, Skean 1631 (A, BR, FLAS, IJ, JBSD, MO, NY, P, S, US); Morne Tranchant, slopes just below and W of Teleco Transmission Towers, 1780-1890 m, Skean 2020 (A, FLAS, NY, S, US); Morne Gordée, N-facing slopes below Morne Tranchant, ca 1550 m, Skean 2042 (FLAS, NY, US); Furcy, beside a spring in a cleared area, 1430 m, Skean 2121 (FLAS, NY, S, US). DÉPT. DU SUD-EST: Morne d'Enfer, disturbed cloud forest, 1850-1880 m, Judd 4663 (FLAS); Morne Fen Noir, summit of E peak, ca 1735 m, Judd 4750 (FLAS); ibid., on ridge just W of Morne Fen Noir, 1705 m, Judd 4753 (A, FLAS, NY, S, US); ibid, saddle between Morne d'Enfer & Morne Fen Noir, 1705 m, Judd 4783 (A, FLAS, IJ, NY, P, S, US); ibid., Skean 1055 (FLAS, NY, US); ibid., Skean 1056 (FLAS, NY, S, US).--HISPANIOLA OR WITHOUT LOCALITY [probably all from the Massif de la Selle of Haiti, near Port-au-Prince]. Saint Domingue, Anon. [probably a Martin or la Jacopière coll.] (BR(fragment) from Herb. Cogn); Saint Domingue, Anon. [probably a Martin or la

Jacopière coll.] (L(fragment) from Herb. DC.); Antilles, 1792, la Jacopière s.n. (photos of P sheet from Herb. Juss. at F, NY, US).

Traditionally, M. multiflorum and morphologically similar taxa have been treated as a single, widespread, polymorphic species, M. amygdalinum, found on all four of the Greater Antillean islands. See discussion under M. amygdalinum for details of the long-perpetuated misapplication of this name. The diverse entities recognized erronously under the name M. amygdalinum are treated here as five different species: M. axillare, which is endemic to Jamaica, M. integrifolium, which occurs on Cuba and northern Hispaniola, M. septentrionale, which is endemic to the Cordillera Septentrional of Hispaniola, M. latifolium, which is endemic to Puerto Rico, and M. multiflorum. These morphologically similar species are rather arbitrarily termed the M. multiflorum complex, s.s. (see discussions under Phylogeny and Phenetic Studies).

The type material of M. multiflorum was collected by Joseph Martin in 1789 (Jiménez 1985), probably in the mountains near Port-au-Prince, Haiti (see discussion under M. amygdalinum). A sheet labeled "isotype" of Melastoma multiflora from Paris (P), based on pubescence and leaf base characters, is definitely from the Massif de la Selle-Sierra de Baoruco. Examined also were photographs of the sheet that may be considered the holotype of Mecranium

multiflorum, which was a Martin collection photographed overlain with the left half of the sheet labeled "isotype" that I examined, and thus included labels from the "isotype" sheet. However, the original sheet could not be located at Paris (S. Barrier, pers. comm., 5 Jun 1987).

Mecranium multiflorum is distinct, even in vegetative condition, from the sympatric species, M. amygdalinum and M. birimosum. The latter lack leaves with margins that are usually strongly revolute near the base, forming basal "pseudodomatia." These pouches on M. multiflorum may be inhabited by mites and/or small insects. In the Massif de la Selle, M. multiflorum is most similar to M. birimosum, a more robust species with larger flowers, markedly different anthers, and thicker leaves that lack pseudodomatia. Of other Hispaniolan species, M. multiflorum is most similar to M. integrifolium, and M. septentrionale (see Key and Phenetic Studies).

The plants of M. multiflorum known from the extreme eastern Massif de la Hotte of Haiti generally have leaves that are somewhat narrower than those from populations in the Massif de la Selle-Sierra de Baoruco.

According to Pierre-Noel (1971) the common name used by the Haitians for this species is "bois pigeon." During my travels in Haiti I have not heard any specific common name applied to this species, and on several occasions have found "bois pigeon" used for Comocladia pinnatifolia L. (Anacardiaceae). Liogier (1974) reported that this species

(as M. amygdalinum) had the common names "palito de vara," "pega pollo," and "sangre de pollo" in the Dominican Republic.

A beautiful color engraving of M. multiflorum can be found in Richard (1812, plate 37).

12. Mecranium revolutum Skean & W. Judd, Brittonia 38: 230. 1986.--TYPE: HAITI. Dépt. du Sud: Massif de la Hotte, just SW of Morne Formon, slopes S of Morne Cavalier at a point 232° from where the Rivière Port-à-Piment flows into the ocean, ca 1100 m, young fr, 5 Jul 1985, Skean 1649 (holotype: FLAS!; isotypes: EHH!, JBSD!, NY!, P!, S!, US!).

Shrub or small tree to ca 5 m tall. Twigs slightly to moderately 4-angled, 1-3 mm in diameter, smooth, essentially glabrous, but youngest buds and nodal ridges often with a few unbranched to irregularly branched and matted multicellular hairs; internodes 0.4-1.5 (6.5) cm long. Leaf blade coriaceous, elliptic or obovate, 2-5 (6) cm long, 1.4-2.3(4.4) cm wide, often strongly inrolled abaxially; apex obtuse or rounded; base cuneate or slightly decurrent; margin slightly to strongly revolute, especially near base, obscurely serrate in distal ca 3/4; venation suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 2-4 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein, largest pair of secondary veins, and

tertiary veins slightly to strongly impressed in living material, often flattening upon drying; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins flat, the surface essentially glabrous, but with caducous tufts of hairs present in axils at junction of midvein and largest secondary veins, minute glandular hairs also present. Petiole 0.5-1.3 (1.9) mm long, glabrous. Inflorescences usually borne on leafless nodes below leaves, less commonly in leaf axils, (1) 2.3-4 cm long, 0.8-1.8 cm wide, 1-2 branched; peduncle 0.9-1.2 mm long. Hypanthium slightly obconical or subglobose ca 1.2 mm long, ca 1.4 mm wide, glabrous or very sparsely pubescent with minute glandular hairs, the portion free from ovary ca 0.5 mm long; portion of calyx bearing external teeth ca 0.2 mm long. Calyx teeth ca 0.1 x 0.1 mm. Calyptra conspicuous in bud, the caducous apiculum ca 0.1 mm long. Petals white, obovate, ca 1.4 mm long, ca 0.9 mm wide, slightly cupped adaxially, spreading; apex rounded, emarginate. Stamens white; proximal segment narrowly ovate, 1.4 mm long, ca 0.4 mm wide; distal segment narrowly obovate, ca 1.4 mm long, ca 0.4 mm wide, the anther sacs ca 0.6 mm long, opening by a single, gaping, 2-chambered foramen formed from 2 lateral slits, the septum torn, the connective prolonged 0.8 mm beyond bases of anther sacs. Ovary inferior, ca 0.8 mm long, ca 1.2 mm wide, the apical appendage ca 0.4 mm high;

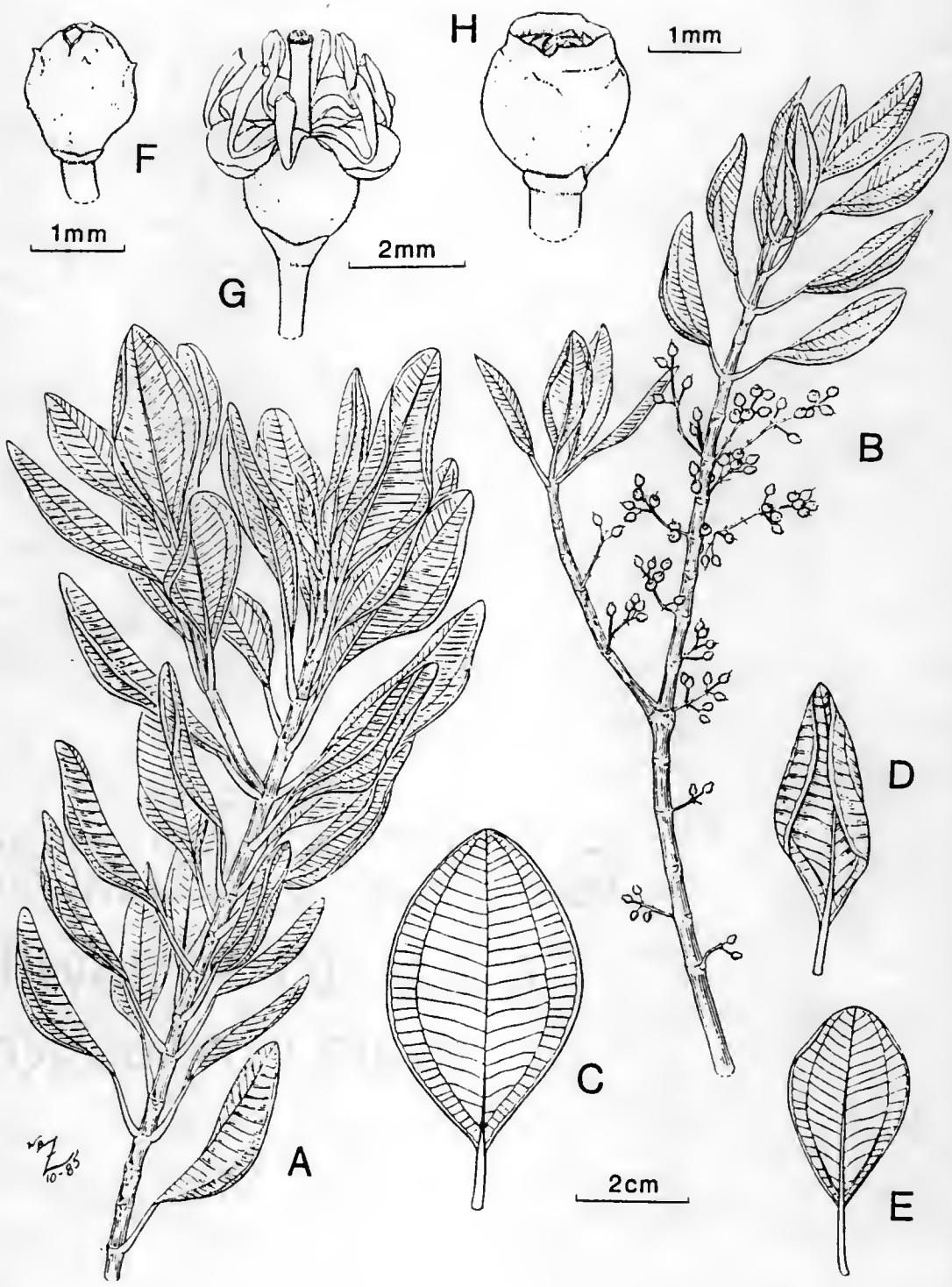
style white, straight or slightly curved, ca 2.5 mm long, ca 0.3 mm wide; stigma ca 0.3 mm wide. Immature berries ca 1.8 x 2 mm, green or tinged heavily with red-purple, glabrous or with a few minute glandular hairs; immature seeds ca 0.6 x 0.3 mm. Fig. 41.

Phenology. This poorly known species probably flowers in April and May and produces mature fruits in late summer.

Distribution and Habitat. Hispaniola (Fig. 37): endemic to the Massif de la Hotte of Haiti where it is known from "rak bwa," i.e., moist hardwood forests on karst, and low elevation broad-leaved cloud forests of the Morne Formon region; 950-1250 (1600) m. See Skean & Judd (1986) and Judd (1987) for detailed discussions of the highly endemic vegetation of this region.

ADDITIONAL SPECIMENS EXAMINED. HAITI. DÉPT. DU SUD: (all from the Massif de la Hotte, vicinity of Parc National Pic Macaya): Bwa Formon (=Bois Formon), i.e., woods near settlement of Formon on plain S of Morne Formon, 950-1140 m, Judd 3433 (EHH, FLAS, NY), ca 1200 m, Judd 3494 (EHH, F, FLAS, JBSD, S, US); ibid., hills S of Morne Formon, 1200-1250 m, Judd 3971 (A, DUKE); just S of Parc Macaya along trail ca 0.5 km N of Sou Bwa (=Sous Bois), ca 1000 m, Skean 1257 (A, EHH, FLAS), Skean 1315 (EHH); Skean 1316 (FLAS); Parc Macaya, N slope of Morne Formon in ravine of Rivière du Sud between Morne Formon and Pic Macaya, ca 1600 m, Skean 1328 (FLAS); ibid., S slope of Pic Macaya in ravine of

Fig. 41. Mecranium revolutum. A. Habit, vegetative branch. B. Habit, branch with young fruits. C-E. Leaves, abaxial surfaces. F. Flower bud. G. Flower. H. Young fruit. (Drawings for A, B, D, & H from Skean 1257, for C, E, F, & G from Skean 1316). Reprinted with permission from Brittonia 38: 231. 1986.


F
1mm
G
2mm
H
1mm
A
B
C
D
E
2cm

Rivière du Sud, ca 1500-1530 m, Skean 1350 (A); just S of Parc Macaya along trail ca 0.5 km N of Sou Bwa, ca 1000 m, Skean 1558 (S); Parc Macaya, slopes S of Morne Cavalier, ca 1100 m, Skean 1644 (F, MO, S, US); locality same as Skean 1350, Skean 2091 (FLAS, NY, S); ibid., Skean 2116 (FLAS, NY, S).

Mecranium revolutum is a relatively glabrous member of the M. multiflorum complex, s.l., with impressed veins, and obovate to elliptic, often strongly revolute/inrolled leaves. Plants of this species may be most easily confused with obovate-leaved individuals of Mecranium birimosum that were described originally as M. torbecianum, after Torbec, a nearby town. The flowers of M. birimosum are larger than those of M. revolutum, have additional internal calyx projections (see Fig. 47I), and anthers that open by two slits, not a gaping foramen (see Fig. 41E-G and discussion under M. birimosum).

Mecranium revolutum may be very closely related to M. alpestre and M. tricostatum, two species of higher elevations in the Massif de la Hotte, which both occur on the ridge of Morne Formon. Both of these taxa have reproductive shoots with much smaller leaves. Mecranium tricostatum is glabrous or with hairs lining only the internodal grooves, has well-developed "pseudodomatia," and veinlets that are raised abaxially. Mecranium alpestre, on the other hand, has twigs that are more or less covered with

unbranched to irregularly branched and matted, often scale-like aggregations of hairs. See discussions under these species and Skean & Judd (1986). Neither of these species has leaves that are as strongly abaxially inrolled as those of M. revolutum.

The specific epithet of this taxon refers to these inrolled leaves, which are most pronounced in individuals growing under conditions of high sunlight.

A putative hybrid between M. revolutum and M. haitiense was collected at ca 0.5 km N of Sou Bwa at ca 970 m elevation (see discussion under M. haitiense).

13. Mecranium integrifolium (Naudin) Triana, Trans. Linn. Soc. 28: 139. 1871. Ossaea integrifolia Naudin, Ann. Sci. Nat. Bot. Sér. 3. 17(5): 337. 1851. Mecranium amygdalinum (Desr.) C. Wright in Sauvalle var. integrifolium Cogn. in A. & C. DC., Mon. Phan. 7: 982. 1891.--TYPE: CUBA. [Oriente]: vicinity of San Yago, Nima Nima, fl, Aug 1844, Linden 2125 (holotype: P!; isotypes: BM!, BR(2)!, E!, G(5)!, MO!, NY(2)!, P!).

Ossaea integrifolia Naudin var. latifolia Naudin, Ann. Sci. Nat. Bot. Sér. 3. 17(5): 337. 1851.--TYPE: CUBA. [Oriente]: Sierra Maestra, fl, Jul 1844, Linden 2010 (holotype: P!; isotypes: BM!, BR(2)!, G(2)!, MO!, NY(2)!).

Shrub or small tree to ca 5 m tall. Twigs slightly to moderately 4-angled, 1.5-3 mm in diameter, smooth, essentially glabrous to pubescent with brown unbranched to irregularly branched and matted multicellular hairs concentrated in internodal grooves and on nodal ridges of youngest twigs; internodes (0.6) 1-2.9 (7.2) cm long. Leaf blade coriaceous, narrowly ovate or elliptic, (1.6) 2.5-10.4 cm long, 0.8-3.2 (3.9) cm wide, often slightly curved abaxially; apex acuminate; base cuneate or slightly decurrent, less commonly acute; margin plane or often revolute near base forming basal pseudodomatia, very obscurely to conspicuously serrate on distal ca 3/4; venation generally suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 0.5-11 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein, largest pair of secondary veins, and tertiary veins ± flat or slightly to strongly impressed, usually flattening upon drying; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or slightly raised, the quaternary and higher order veins flat, or (in subsp. alainii) often slightly raised, the surface appearing nearly glabrous or pubescent with hairs similar to those on stem concentrated on veins and in persistent axillary tufts at junction of midvein and largest secondary veins, minute glandular hairs also present, marsupiform domatia absent at junction of midvein and

largest secondary veins. Petiole (2) 4-19 mm long, essentially glabrous or pubescent with hairs similar to those on stem concentrated on edges of groove. Inflorescences borne in leaf axils and on leafless nodes below leaves, 1.3-2.6 (3.4) cm long, 0.5-2 cm wide, 1-2 branched; peduncle 5-15 mm long. Hypanthium slightly obconical or subglobose, 1.3-2.1 mm long, 1.4-2.2 mm wide, sparsely to moderately pubescent with minute glandular hairs, the portion free from ovary 0.4-0.7 mm long; portion of calyx bearing external teeth 0.2-0.3 mm long. Calyx teeth ca 0.2 x 0.2 mm. Calyptra conspicuous in bud, the caducous apiculum ca 0.1 mm long. Petals white, obovate, 1.3-2.2 mm long, 0.9-1.5 mm wide, slightly cupped adaxially, spreading; apex rounded, emarginate. Stamens white; proximal segment narrowly ovate, 1.3-2 mm long, 0.3-0.7 mm wide; distal segment narrowly obovate, 1.3-1.8 mm long, ca 0.3-0.6 mm wide, the anther sacs 0.3-0.8 mm long, usually opening by a single gaping foramen, septum torn. Ovary inferior, 0.8-1.4 mm long, 0.9-1.4 mm wide, the apical appendage 0.3-0.6 mm high; style white, straight or slightly curved, 2.6-3.2 mm long, 0.3-0.4 mm wide; stigma 0.3-0.4 mm across, expanded. Berries ca 5 x 5 mm, purple-black, glabrous or with a few minute glandular hairs; seeds 6-7 x 3-4 mm.

Phenology. Mecranium integrifolium is known to flower from April through October, reaching a peak of flowering in

June and July. Mature fruits are produced beginning in early fall.

Key to the Subspecies of Mecranium integrifolium

1. Leaves membranaceous or coriaceous, lamina 0.17-0.3 mm thick (measured at midleaf away from major veins), smallest veinlets flat on abaxial surface, axillary tufts usually present at junction of midvein and largest 2° veins on abaxial surface; Cuba or N. Hispaniola.
   2. Leaves usually appearing nearly entire to very obscurely toothed, the teeth 0.08-0.17 (0.25) mm high, teeth apices ± same thickness as margin; Cuba.

      13a. M. integrifolium subsp. integrifolium.

   2. Leaves usually visibly toothed in distal portion, the teeth 0.17-0.32 mm high, apices of teeth usually conspicuously thickened; N. Hispaniola.

      13c. M. integrifolium subsp. neibense.

1. Leaves coriaceous, lamina 0.3-0.4 mm thick, smallest veinlets often raised on abaxial surface in dried material, axillary tufts at major vein axils usually absent; E. Cuba.

   13b. M. integrifolium subsp. alainii

13a. Mecranium integrifolium subsp. integrifolium

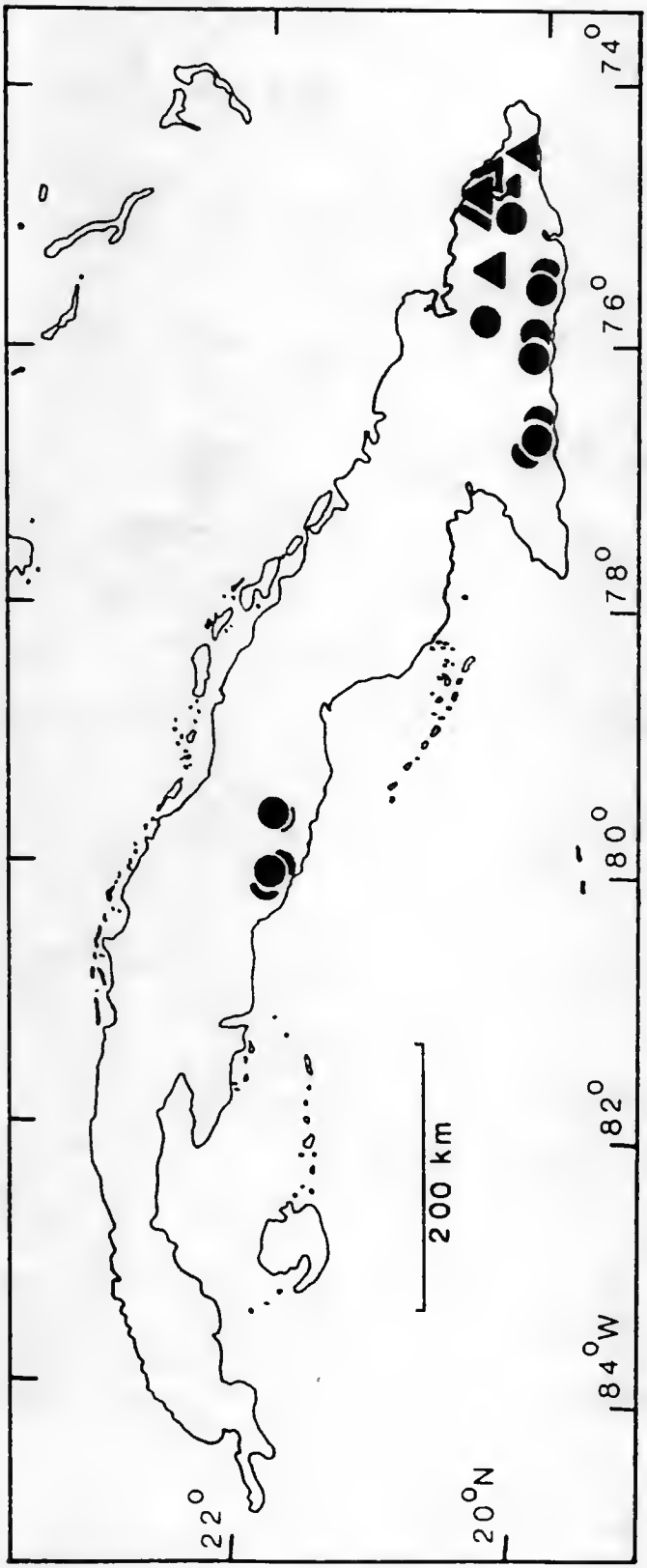
Shrub or small tree with leaves usually appearing nearly entire to obscurely toothed, the teeth 0.08-0.17

(0.25) mm high, their apices not conspicuously thickened. Lamina 0.2-0.4 mm thick, with abaxial surface nearly glabrous to bearing conspicuous axillary tufts of unbranched to irregularly branched and matted multicellular hairs at junction of midvein and largest secondary veins. Smallest veinlets flat abaxially or, less commonly, slightly raised.

Habitat and Distribution. The mountains of central and eastern Cuba (Fig. 42): broad-leaved cloud forests in the Sierra de Trinidad, Sierra de Sancti Spiritus and Sierra Maestra (Cordillera de Turquino and Cordillera de Gran Piedra); (400?) 700-1972 m. See Carabia (1945), León (1946), Seifriz (1943), and Smith (1954) for general discussions of these forests. More references on the vegetation of specific areas are listed in the discussion below.

ADDITIONAL SPECIMENS EXAMINED. CUBA. CIENFUEGOS: Trinidad Mtns., Aguacate, 750-850 m, Britton & Wilson 5370 (F); Pico Sombrero, ca. 1000 m, Webster et al. 229 (A). GRANMA (all from the Sierra Maestra, Cordillera de Turquino): summit of Pico Luigicum, 5960 ft [1817 m], Acuña 6158 (NY); between Alcarraza & Punta de Lanza, 800-1000 m, Bisse & Lippold 19652, 19667 (HAJB); ibid., Bisse et al. 019667 (HAJB); Minas del Frio [label says Cienfuegos Prov.], along road from Minas del Frio to Montpie, Bisse et al. 37227 (HAJB); hill SE of la finca Montpie, 900-1200 m, Bisse et al. 37592 (HAJB); Bartolomé Masó, spur of the slope N of

Fig. 42. Distributions of Mecranium integrifolium subsp. integrifolium (dots) and M. integrifolium subsp. alainii (triangles).


74°
76°
78°
80°
82°
84°W
22°
20°N
200 km

the Sierra Maestra, E of Brazón de Santana, 700-1000 m, Bisse et al. 40349 (HAJB); ibid., in the zone of loma de la sabina, Bisse et al. 40574 (HAJB). GUANTANAMO [Meseta del Guaso]: La Perla to Pinales de Monte Verde, 660 m, Shafer 8810 (NY, US); near Monte Verde, Wright 181 (BR, G, GH, GOET, MO, NY). HOLGUIN: Los Mulos-Cayo Verde, Mayari, López 2123 (HAJB). SANCTI SPIRITUS: [Alturas de Trinidad], Topes de la Collantes, 800 m, Alain 6333 (GH); base of Pico Porterillo, Alain 6416 (GH, HAC); foot of the cliff of Pico Porterillo, Topes de Collantes, 950 m, Alain 6449 (GH); Topes de Collantes, NW of Pico Porterillo, 600-800 m, Bisse et al. 34797 (HAJB); [Alturas de Sancti Spiritus], Fomento, Caballete de Casas, 400-700 m, Bisse et al. 40978 (HAJB); ibid., Loma La Diana, 600-700 m, Bisse et al. 41102 (HAJB); ibid., Loma Gavilanes, alto del Jubo, 500-700, Bisse et al. 41149 (HAJB); slopes of Pico Porterillo, 700-900 m, Ekman o13987 (BM, G, S); Buenos Aires, Trinidad Hills, 2500-3500 ft [760-1064 m], Jack 7247 (A, US); ibid., Jack 8090 (A, F, S); [Alturas de Sancti-Spiritus], León & Clément 6576 (NY); ibid., Loma la Gloria, 950 m, León & Roca 7970 (NY); ibid., Lomas de Banao, Luna 170, 171 (NY). SANTIAGO DE CUBA (from the Sierra Maestra, Cordillera Turquino or, if indicated, Cordillera de la Gran Piedra): Cordillera de la Gran Piedra, hill S of cafetal Frances, 1000 m, Bisse & Rojas 3766 (HAJB); La Meseta, 800 m, Bisse 3835 (HAJB); headwaters of río La Plata, 900-1000 m, Bisse & Lippold 18931 (HAJB); Alto de la Francia [label says Guantánamo Prov.], 700-1100 m,

Bisse 21301 (HAJB); Cobre Range, Loma del Gato, 1000 m, Clemente 1811 (GH); ibid., Clemente 1834 (HAJB, NY, US); ibid., Clemente 1939 (NY); Cordillera de la Gran Piedra, trail near Gran Piedra, 1200 m, Clemente 7350 (NY); ibid., base of La Gran Piedra, Dietrich et al. 50825 (HAJB); ibid., Gran Piedra, near the big stone, 1150-1800 m, Ekman o1656 (BM, G, S); Cobre Range, Monte Real, 700 m, Ekman o7845 (S, US); on the main ridge above Daiquiri, 1000 m, Ekman o8099 (S); Firmesa, ca 750 m, Ekman o8743 (S); on the water divide between río Yara & río Plata, ca 1100 m, Ekman o14265 (S); Pico Turquino, on the very top, 2040 m [1972 m], Ekman o14517 (S, US); Loma Barbí, ca. 700 m, Ekman o15655 (G, NY, S); Cobre Range, Loma San Juan, El Gato, Hioram 7195 (GH); Cobre Range, Loma del Gato, 1000 m, León 9881 (GH, NY, US); Pico Turquino, summit, 1980 m [1972 m], Lippold & Gonzalez 18830 (HAJB); Loma del Gato, Pico del Gato, López 1434 (HAJB, US); ibid., López 1445 (US); Cobre Range, Loma San Juan, El Gato; Cordillera de la Gran Piedra, La Gran Piedra, ca. 1200 m, López 2632 (HAJB, IJ, US). VILLA CLARA: N of Pico Porterillo, 700-800 m, Bisse & Duek 1025 (HAJB).

13b. Mecranium integrifolium subsp. alainii Skean, subsp. nov.--TYPE: CUBA. ORIENTE [HOLGUIN]: wet woods, Delta Mines, Moa, Alain et al. 914 (holotype: NY!; isotype: HAC!).

Subspecies haec a subspecies typo differt foliis glabris crassioribus, venulis plerumque elevatis abaxialibus.

Shrub or small tree with leaves coriaceous (midvein and lamina 0.5-0.7 mm thick at leaf center), appearing essentially glabrous beneath, i.e., lacking hairs at junction of midvein and largest secondary veins on abaxial surface. Smallest veinlets often slightly raised abaxially in dried material. Twigs essentially glabrous.

Habitat and Distribution. Cuba (Fig. 42): hardwood forests and disturbed areas in mountains of Holguín and Guantánamo provinces: the Cuchillas de Moa, Cuchillas de Toa, Cuchillas de Baracoa, Sierra de Imías, and Sierra de Purial; (200) 400-900 (1060) m. Specimens intermediate between this taxon and subsp. integrifolium (indicated by an asterisk (*) in the list below) are known from populations in the Altiplanicie de Nipé, Sierra del Cristal, and Meseta del Guaso. For discussions of the vegetation of these regions see Alain (1946, 1956), Carabia (1945), Capote and Berazaín (1984), León (1941), Shafer (1910), and Webster and Jervis (1952).

ADDITIONAL SPECIMENS EXAMINED. CUBA. GUANTANAMO: Sierra de Frijol [Cuchillas de Toa], La Alegría, Toa, near the summit of Pico Galano [Pico Galán], 1200 m [<974 m], Alain 3726 (HAC, NY); ibid., Alain 3775, 3778 (NY); between Loma "El Mirados" & Loma "Buenavista" on the road from the

river "Baer" to the river "dos Naranjos," Alvarez et al. 26946 (HAJB); lower slopes SW of Loma del Mirador, 500 m, Alvarez et al. 27348 (HAJB); Loma de Buena Vista, 500-600 m, Alvarez et al. 27355 (HAJB); Sierra de Imías, Loma Jubal, Alvarez et al. 27629 (HAJB); dry forest W of Guantánamo Bay, Bisse & Rojas 2348 (HAJB); Baracoa, S of the hills of El Yunque, 300-400 m, Bisse & Rojas 2663 (HAJB); Cupeyal del Norte, at the reservation, Bisse & Rojas 3694 (HAJB); Baracoa, valley NW of El Yunque de Baracoa, Bisse & Köhler 5204 (HAJB); Baracoa, high plain of the Iberia Mine, 600-700 m, Bisse & Köhler 6170 (HAJB); Sierra del Purial, La Gurbia, 700 m, Bisse & Rojas 8565 (HAJB); Cuchillas de Toa, Sierra de Magüey, 700 m, Bisse 16791 (HAJB); Baracoa, S of the hills of El Yunque, 300-400 m, Bisse 21472, 21473 (HAJB); Santa María, plateau of the Iberia Mines, 700 m, Bisse et al. 25638 (HAJB); Loma del "Ceuarico," NW of camp "Los Naranjos," 200-400 m, Bisse & Meyer 26910 (HAJB); Quibiján, on the road to Vega de la Palma, Bisse et al. 36892 (HAJB); Sierra de Imías, Loma de la Maestra, near Yamagua, Bisse et al. 39518 (HAJB); Palenque, Bernardo, Sierra de Frijol, NW of Pico Galano, 800 m, Bisse et al. 49716 (HAJB); ibid., Loma Bernardo, 800-900 m, Bisse et al. 49950 (HAJB); Imías, Sierra de Imías, Tres Piedras, 800-900 m, Bisse et al. 52020 (HAJB); ibid., slopes N of Loma de Tres Piedras, 900-1000 m, Bisse et al. 52624 (HAJB); ibid., on the summit of Loma Majagua Hueca, 700 m, Bisse et al. 53220 (HAJB); ibid., Loma de las Cabezadas del río Jojo, 900-1060 m, Bisse 53478

(HAJB); HOLGUIN: vicinity of Moa, Cayo Guam, Acuña 12634 (US); Delta Mines, Moa, Alain & Clemente 914 (HAJB, NY); La Iberia, Alvarez & Berazaín 24184 (HAJB); Moa, vicinity of La Melba, 450-500 m, Alvarez et al. 42214 (HAJB); Moa, vicinity of La Melba, Alvarez et al. 42385 (HAJB); vicinity of the Limones rivulet camp, Alvarez et al. 56109 (HAJB); Moa, 5 km S of the Limones rivulet, Alvarez et al. 56386 (HAJB); Moa, Monte de la Breña, 300-500 m, Bisse & Köhler 6402, 6453 (HAJB); Moa, on the high plain of the Sierra de Moa, 600-900 m, Bisse & Köhler 6654 (HAJB); Moa, La Melba, 400-500 m, Bisse & Köhler 7069 (HAJB); Sierra del Cristal, slopes N of the central "maciso," 900-1000 m, Bisse & Köhler 8453 (HAJB); Moa, La Melba, 500 m, Bisse & Lippold 11101 (HAJB); ibid., Jiguani valley, Bisse & Lippold 11230 (HAJB); Moa, on the high plain of the Sierra de Moa, 600-900 m, Bisse & Lippold 11706 (HAJB); Moa, Sierra de Moa, between Revuella de los Chinos and Loma Galinga, 800-900 m, Bisse & Lippold 17950 (HAJB); Cayo Probado, banks of the headwaters of the río Jiguani, Bisse & Berazaín 21879 (HAJB); slopes S of the Sierra de Moa, road to the Yarey Mine, Bisse & Berazaín 22348 (HAJB); Moa, vicinity of La Melba, 450-500 m, Bisse et al. 42214 (HAJB); ibid., Bisse et al. 42385 (HAJB); Moa, La Veguita, Monte La Breña, in the "charrascales," 400-500 m, Bisse et al. 44140 (HAJB); Moa, Sierra de Moa, N ascent, 800 m, Bisse et al. 44225 (HAJB); Moa, vicinity of La Melba, 400-500 m, Bisse et al. 44960 (HAJB); Moa, La Breña, road near the Limones river, 400 m, Bisse et al. 45047 (HAJB);

Cayo Mambí, Sierra del Cristal, Palenque, 500-600 m, Bisse et al. 45273 (HAJB); Moa, Clemente 4412 (IJ, NY); Moa, La Breña, 300-400 m, Dietrich et al. 45457 (HAJB); Baracoa, Iberia Mines, 800 m, Ekman o3817 (NY, S); Sierra [Altiplanicie] de Nipé, 5 km S of Woodfred, Howard 6130 (GH, NY); Moa, La Melba, Lippold 16445 (HAJB); Iberia Mine road to La Melba, Lippold 16463 (HAJB); Moa, La Melba, slopes E of the Sierra de Moa, 500-800 m, Lippold 16573 (HAJB); Sierra [Altiplanicie] de Nipé, near Woodfred, along Bandera trail, Shafer 3515 (NY, US). SANTIAGO DE CUBA: slopes S of the Sierra del Cristal, Alain & López 4769 (GH, HAJB); Sierra del Cristal, around the río Lebisa, Areces et al. 30410 (HAJB); Sierra del Cristal, slopes S of the mountains, 700-800 m, Bisse 8377 (HAJB).

13c. Mecranium integrifolium subsp. neibense (Skean) Skean, comb. & stat. nov., Mecranium neibense Skean, Brittonia 39: 192. 1987.--TYPE: DOMINICAN REPUBLIC. Independencia: Sierra de Neiba, along the Carretera Internacional near the Haitian border, 30.6 km N of La Descubierta, broad-leaved cloud forest, 1615 m, 30 May 1986, fl, Skean 1826 (holotype: FLAS!; isotypes: A!, BR!, F!, JBSD!, MO!, NY!, S!, US!).

Shrub or small tree with leaves usually visibly toothed, the teeth 0.17-0.32 mm high, usually thickened at their apices. Lamina 0.1-0.2 mm thick, with abaxial surface

bearing persistent axillary tufts of unbranched to irregularly branched and matted multicellular hairs at junction of midvein and largest secondary veins. Fig. 43.

Habitat and Distribution. Hispaniola (Fig. 40): broad-leaved cloud forests in the Cordillera Central-Massif du Nord and Sierra de Neiba-Massif des Cahos; 700-2000 m. See Skean (1987) for a list of associated species.

ADDITIONAL SPECIMENS EXAMINED. DOMINICAN REPUBLIC. Cordillera Central: Moncíon, at the junction of río Cenobi with río Cenobicito, 700 m, Ekman H12925 (S); Plan de Higuey (in río Nizao valley), 18°32'N, 70°23'W, 10-11 Apr 1975, Franjul s.n. (JBSD); lowland forest near La Ciénega, 1100-1200 m, Gastony et al. 407 (GH, NY(2), US). Sierra de Neiba: along the Carretera Internacional near the crest of the range along the Haitian border, 1700-2000 m, Gastony et al. 453 (GH, NY, US); ibid., 1560 m, Judd 5197 (FLAS, JBSD); 30.3 km N of La Descubierta, 1585 m, Skean 1823, 1824 (both A, FLAS, JBSD, MO, NY, S, US); 30.7 km N of La Descubierta, 1625 m, Skean 1827 (A, BR, FLAS, G, JBSD, MO, NY, S, US); 31.7 km N of La Descubierta, 1670 m, Skean 1828 (A, BM, FLAS, GOET, JBSD, MO, NY, P, S, US); 34.2 km N of La Descubierta, 1820 m, Skean 1830 (A, DUKE, F, FLAS, JBSD, MO, NY, S, UC, US).--HAITI. Massif des Cahos: Petit Riviere de l'Artibonite, 1500-1600 m, Ekman H3472 (S). Massif du Nord: Port-Margot, Morne Brigand, 800-900 m, Ekman 2945 (IJ, S); Port-au-Paix, Haut-Piton, towards Morne Chavary, ca 1100 m,

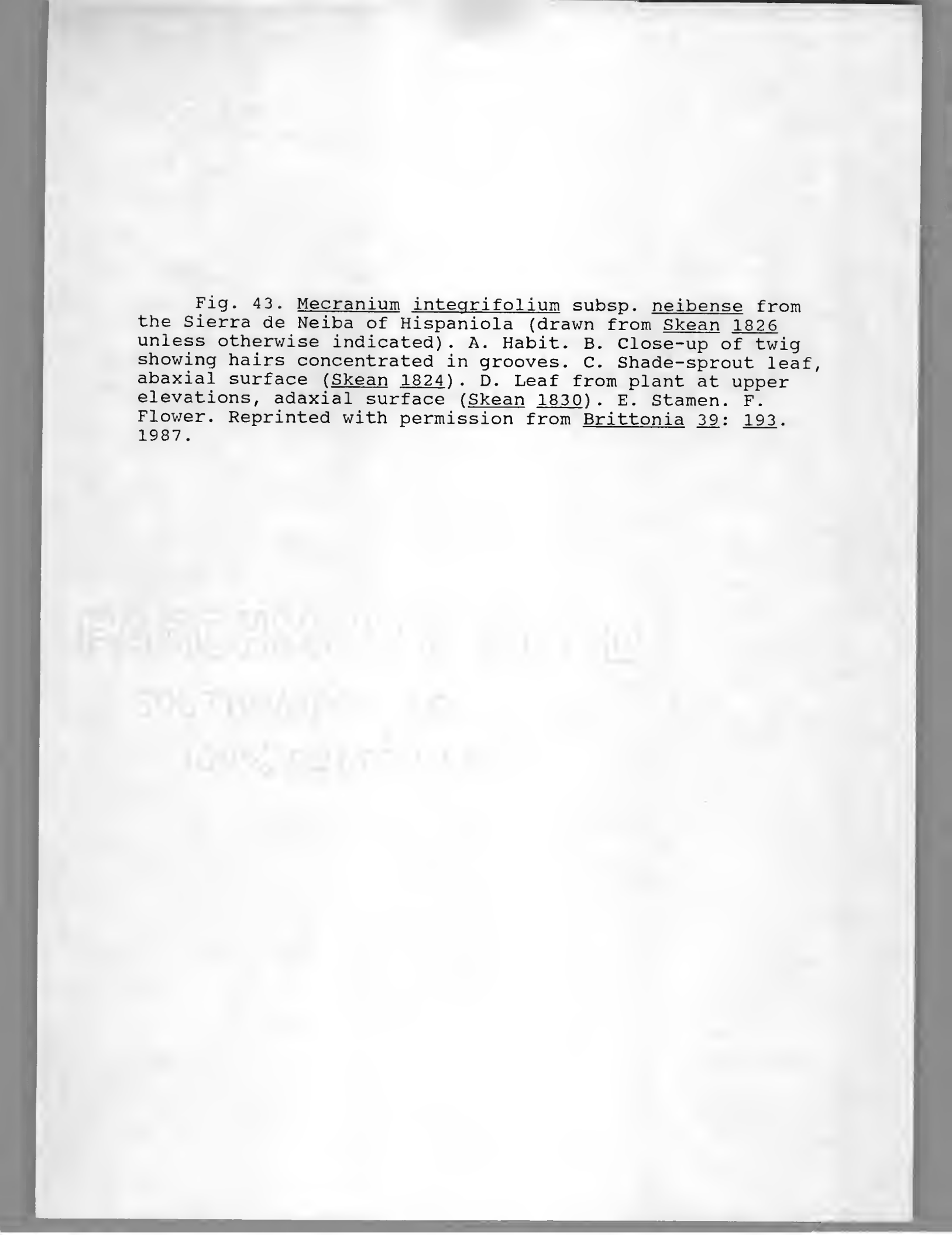
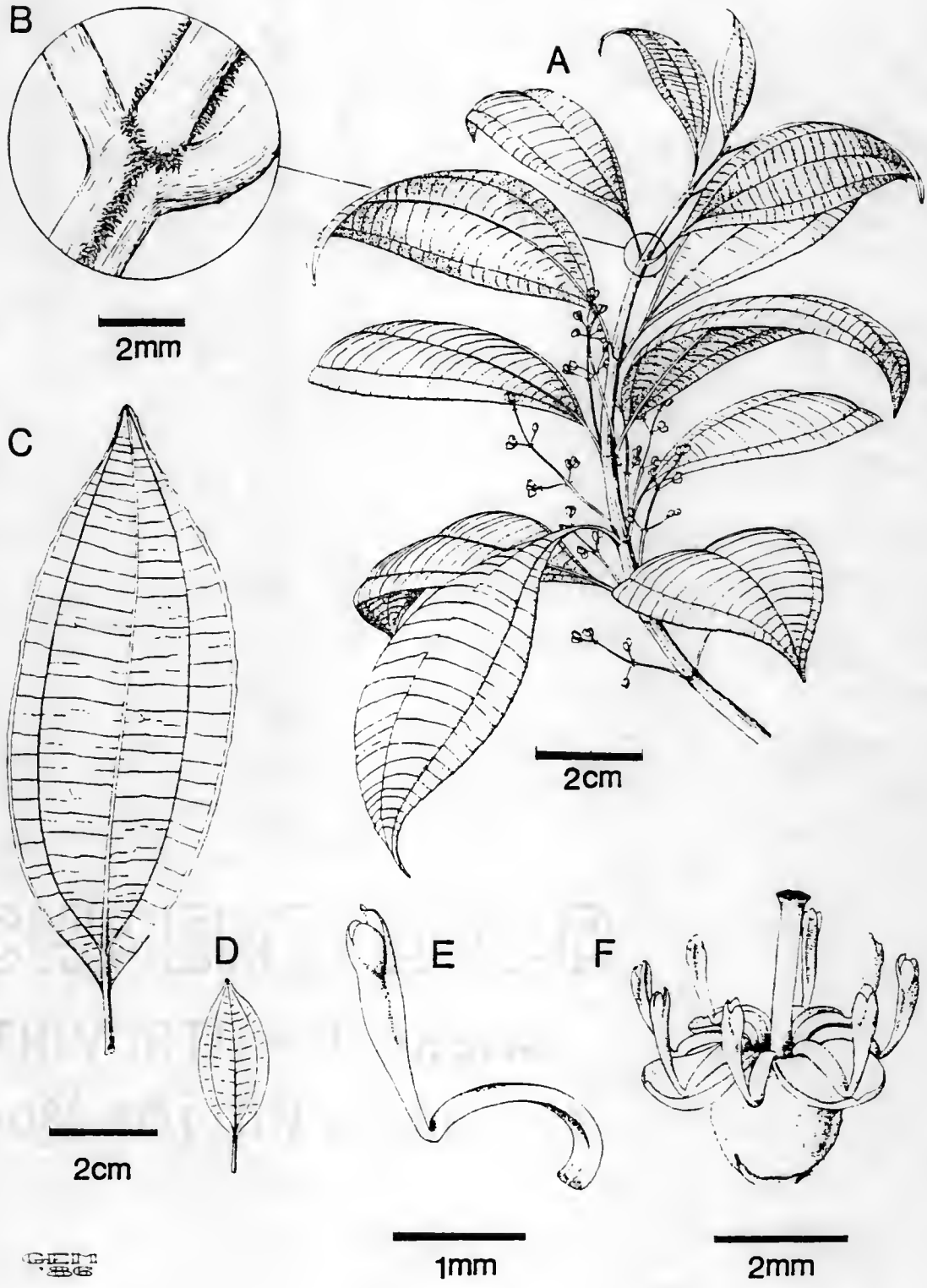


Fig. 43. Mecranium integrifolium subsp. neibense from the Sierra de Neiba of Hispaniola (drawn from Skean 1826 unless otherwise indicated). A. Habit. B. Close-up of twig showing hairs concentrated in grooves. C. Shade-sprout leaf, abaxial surface (Skean 1824). D. Leaf from plant at upper elevations, adaxial surface (Skean 1830). E. Stamen. F. Flower. Reprinted with permission from Brittonia 39: 193. 1987.


B
2mm
A
2cm
C
2cm
D
E
1mm
F
2mm

Ekman 5143 (IJ, NY, S, US); Ennery, top of Morne Basile, 1425 m, Ekman 8445 (NY, S, US).

Mecranium integrifolium is the most widespread and polymorphic species in the genus. Although cladistic studies are equivocal, the species is closest phenetically to M. axillare of Jamaica and M. multiflorum of Hispaniola and may very well be most closely related to these taxa (see Key). Three weakly defined subspecies are recognized based on leaf thickness and marginal tooth size. About five percent of the specimens examined exhibited some morphological overlap.

Mecranium integrifolium subsp. integrifolium occurs in the central and eastern mountains of Cuba. In the Sierra Maestra (Cordillera del Turquino and Cordillera de la Gran Piedra) of eastern Cuba, this taxon occurs at elevations of 700-1972 m, and the plants have leaves bearing persistent axillary tufts of hairs located on the abaxial surface at the junction of the midvein and two largest secondary veins. The plants of lower elevations have glabrous twigs, while those of upper elevations (above ca. 1800 m) often have twigs that are pubescent with hairs concentrated in internodal grooves. The plants of these populations typically have leaves with poorly developed marginal teeth. See Webster (1952) and León (1922, 1924) for discussions of the flora and localities in the Sierra Maestra, and Jervis

(1953) for a discussion of a botanical expedition to Gran Piedra.

In the mountains of central Cuba, the Sierra de Trinidad and Sierra de Sancti Spiritus, plants of M. integrifolium subsp. integrifolium have relatively glabrous twigs, and may or may not have axillary tufts on the leaf abaxial surfaces. The marginal teeth on the leaves of plants from this area tend to be larger and slightly more conspicuous than in plants from the Sierra Maestra.

The most unusual populations of M. integrifolium subsp. integrifolium are found in the Sierra de Nipé and Sierra de Cristal, where this taxon intergrades morphologically with M. integrifolium subsp. alainii. Some populations in this region have leaves with veinlets that are slightly raised abaxially and have tufts of hairs in the two major veins axils on the abaxial surface. Roig (1965) reports (as M. amygdalinum) that M. integrifolium subsp. integrifolium is known by the common name "cordobancillo."

Mecranium integrifolium subsp. alainii is endemic to the wet hardwood forests scattered among the serpentine pinelands of the northeastern part of what was formerly known as Oriente Province. This taxon has thick leaves that lack abaxial tufts of hairs, and which usually have their smallest veinlets raised abaxially. Plants from different populations are variable in leaf shape, thickness, and the degree to which the smallest veinlets are raised. The most distinctive, thickest-leaved individuals occur in the Moa-

Baracoa region. These populations have been recognized by Alain (1957) and Bisse et al. (1985) as M. purpurascens, a species that is actually endemic to Jamaica (see discussion under M. purpurascens). As stated above, complete morphological integradation between these thick-leaved populations and more typical plants of M. integrifolium can be seen in specimens from the Sierra de Nipé and Sierra de Cristal. See Alain (1946, 1954), Bisse (1981), Bisse and González (1981), Bisse et al. (1985) and Webster (1952) for discussions of the vegetation in the Moa-Toa-Baracoa region, Carabia (1945) and Shafer (1910) for discussions of the vegetation of the Sierra de Nipé, and Alain (1956) for a discussion of the vegetation of the Sierra de Cristal.

Careful study of this variable taxon in the field is needed to determine if various geographically isolated populations warrant formal taxonomic recognition. For now, it is useful to recognize these plants as a geographical subspecies, which I have named for Dr. Alain H. Liogier, prolific collector and living pioneer of Antillean botany.

Mecranium integrifolium subsp. neibense is endemic to Hispaniola where populations occur in the Cordillera Central-Massif du Nord and Sierra de Neiba-Massif des Cahos. The populations of these two mountain ranges are morphologically distinct from each other. In the Sierra de Neiba-Massif des Cahos this taxon occurs at elevations of 1500-2000 m, and the plants have twigs that are pubescent along their internodal grooves. On the other hand,

populations from the Cordillera Central-Massif du Nord occur at lower elevations (700-1425 m) and have glabrous twigs. It is likely that further collecting will reveal populations from the lower elevations of the Sierra de Neiba that have glabrous twigs as well as populations from the higher elevations of the Cordillera Central-Massif du Nord that have pubescent twigs. Similar elevational variation is seen in populations of M. integrifolium subsp. integrifolium from the Sierra Maestra of Cuba. The phenetic distinctness and superficial similarity of the Sierra de Neiba plants to M. puberulum, a species of the Cordillera Central, caused Skean (1987) to recognize the plants from the Sierra de Neiba as a distinct species: M. neibense.

14. Mecranium axillare (Macfad.) Skean, comb. nov., Cremanium axillare Macfad., Fl. Jamaica 2: 92. 1850.--TYPE: JAMAICA, without specific locality [probably from the Blue Mtns.], without date, Macfadyen s.n. (lectotype, here designated: K!; isolectotype: BM!, K(right half of sheet)!).

Ossaea brachystachya Naudin, Ann. Sci. Nat. Bot. Sér. 3. 17(5): 337. 1851.--TYPE: JAMAICA, interior of Hanover, fl, Jan 1844, Purdie s.n. (holotype: P!; isotype: K, photo!).

Shrub or small tree to ca 8 m tall. Twigs slightly to moderately 4-angled, 1.5-2 mm in diameter, smooth, essentially glabrous to pubescent with unbranched to irregularly branched and matted multicellular hairs lining internodal grooves; internodes 1.1-2.2 (3.8) cm long. Leaf blade membranaceous to coriaceous, ovate, narrowly elliptic, or narrowly obovate 4.6-13.5 (16.7) cm long, 1.4-3.9 (7.8) cm wide; apex acuminate; base cuneate or slightly decurrent, less commonly acute or nearly rounded; margin plane or slightly revolute, especially near base, serrate in distal ca 3/4; venation suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 2-14 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat or not visible, rarely slightly impressed; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or slightly raised, the quaternary and higher order veins flat or slightly raised, the surface appearing essentially glabrous (actually sparsely pubescent with scattered, minute, glandular hairs) or with well-developed and persistent axillary tufts of hairs at junction of midvein and two largest secondary veins. Petiole 10-29 (59) mm long. Inflorescences borne in leaf axils and on leafless nodes below leaves, 1.3-2.6 (3.4) cm long, 0.6-1.9 cm wide,

1-2 branched; peduncle 3-12 mm long. Hypanthium slightly obconical or subglobose, 1.4-2.4 mm long, 1.3-1.8 mm wide, very sparsely pubescent with minute glandular hairs, the portion free from ovary 0.4-0.6 (0.9) mm long; portion of calyx bearing external teeth 0.2-0.6 mm long. Calyx teeth ca 0.2 x 0.2 mm. Calyptra conspicuous in bud, the caducous apiculum ca 0.1 mm long. Petals white, obovate, 1.5-2 mm long, 0.9-1.5 mm wide, slightly cupped adaxially, spreading; apex rounded, emarginate. Stamens white; proximal segment narrowly ovate, 1.3-1.7 (2) mm long, 0.3-0.5 mm wide; distal segment narrowly obovate, 1.1-1.6 mm long, 0.4-0.5 mm wide, the anther sacs 0.3-0.7 mm long, usually opening by a single gaping foramen, septum torn. Ovary inferior, 0.9-1.5 mm long, 0.8-1.2 mm wide, the apical appendage 0.3-0.6 mm high; style white, straight or slightly curved, 2.7-3.9 mm long, 0.3-0.5 mm wide; stigma 0.3-0.6 mm wide, expanded. Berries 4-6 x 4-6 mm, purple-black, glabrous or with a few minute glandular hairs; seeds ca 0.8 x 0.3 mm.

Phenology. Flowering primarily from March through August with fruits reaching maturity in late summer and fall.

Key the the Subspecies of Mecranium axillare

1. Leaf abaxial surface usually with several to many unbranched to irregularly branched and matted multicellular hairs in axils at junction of midvein and

largest 2° veins, smallest veinlets flat in dried material; young twigs glabrous or pubescent with similar hairs in internodal grooves; lamina 5.3-13.5 (15.4) cm long, petiole 10-29 (44) mm long; hypanthium 1.4-1.8 mm long.

2. Leaf abaxial surface with persistent axillary tufts of hairs at vein junctions; internodal grooves of young twigs usually sparsely to densely pubescent.

14a. M. axillare subsp. axillare.

2. Leaf abaxial surface usually with several hairs in axillary tufts, mostly caducous; internodal grooves of young twigs glabrous.

14b. M. axillare subsp. proctori.

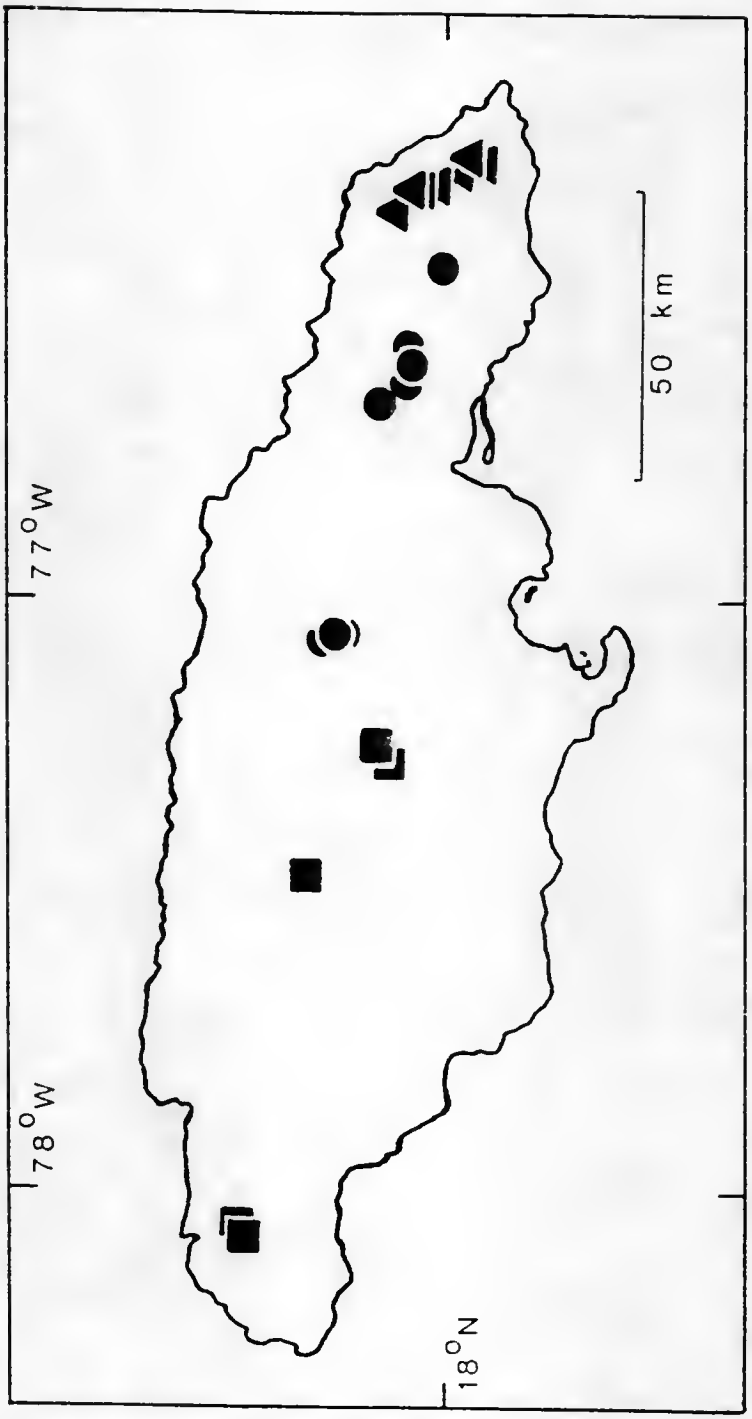
1. Leaf abaxial surface lacking axillary hairs at junction of midvein and largest 2° veins, smallest veinlets usually slightly raised in dried material; young twigs essentially glabrous; lamina 7.4-18.7 mm long, petiole 10-59 mm long; hypanthium 1.6-2.4 mm long.

14c. M. axillare subsp. urbanianum.

14a. Mecranium axillare subsp. axillare

Shrub or small tree with leaves bearing persistent tufts of hairs in axils of junction of midvein and largest secondary veins on abaxial surface of lamina. Internodal grooves of young twigs often conspicuously pubescent.

Fig. 44. Distribution of Mecranium axillare subsp. axillare (dots), M. axillare subsp. proctori (triangles) and M. axillare subsp. urbanianum (squares).


77°W
78°W
18°N
50 km

Habitat and Distribution. Jamaica (Fig. 44): low to mid-elevation cloud forests and disturbed areas in the Blue Mountains and the Mt. Diablo region of St. Ann; 825-1600 m.

ADDITIONAL SPECIMENS EXAMINED. JAMAICA. PORTLAND (all from the Blue Mountians, incl. Port Royal Mountains): Hardwar Gap, 4000 ft [1220 m], Adams 7050 (BM, DUKE, UCWI); vicinity of Moody's [Moodies] Gap, Tweeside [Tweedside], Britton 3409 (NY), Hardwar Gap, trail to waterfall, ca 3900 ft [1189 m], Crosby et al. 646 (DUKE, UC); Silver Hill Gap, 3500 ft [1067 m], Harris 6436 (BM); Hardwar Gap, along "Waterfall Trail" & Oatley Rd., ca 1200 m, Judd 5427 (A, FLAS, G, IJ, JBSD, NY, S, US); Catherine's Peak, near the peak, 1490 m, Judd 5480 (FLAS, IJ); Hardwar Gap, along the waterfall trail, 1210 m, Skean 1905 (A, BM, BR, F, FLAS, G, IJ, JBSD, MO, NY, P, S, US); ibid., Skean 1908 (FLAS, IJ, NY, S, US).--ST. ANN: Moneague, Union Hill, 1850, Alexander s.n. (GH, GOET); beside road on hill ca 0.6 mi N of Hollymount, Mt. Diablo, 2700-2800 ft [823-854 m], Hespenheide 876 (DUKE, FLAS, G(3), GH, MO, NY, UC, US); 2.2 mi W by road of Albion, 2300-2400 ft [701-732 m], Hespenheide 946 (DUKE); along road to Hollymount, Mt. Diablo, ca. 2700 ft [823 m], Proctor 22658 (IJ, NY). St. Catherine: path and limestone hills just W of Hollymount, Mt. Diablo, 2700-2800 ft [823-854 m], Hespenheide 1316 (DUKE, FLAS, GH, MO, NY, UC, US(2)).--ST. THOMAS: Portland Gap, 5250 ft [1600 m], Proctor 9613 (IJ, US).--WITHOUT

SPECIFIC LOCALITY: Marsh 396 (BR-portion of sheet with fragment of Linden 2010 from Cuba, GOET); McNab s.n. (L); Swartz, s.n. (S).

Mecranium axillare subsp. axillare has persistent tufts of hairs at the vein junctions on the leaf abaxial surfaces. This subspecies is easily recognized in the Blue Mountains, where it has young twigs that are densely pubescent in the two longitudinal grooves along each internode. Plants from populations near Mt. Diablo in St. Ann Parish usually bear only a few hairs in these grooves on the very youngest growing portions of the twigs, and may appear quite glabrous.

In the Port Royal group of the Blue Mountains, M. axillare subsp. axillare occurs sympatrically in the same forests with M. purpurascens and M. virgatum at Hardwar Gap, above Kingston and Newcastle. When I observed the three taxa there in July 1986, M. virgatum was in young fruit, M. purpurascens was in flower bud, and M. axillare was just completing flowering. In this and other localities where the taxa occur together they may be reproductively isolated by different flowering periods (see discussion under Ecology). No morphological intermediates between these species from areas of sympatry were observed in the field or in herbarium material. The specimens "intermediate" between M. amygdalinum (=M. axillare) and M. purpurascens cited by Proctor (1972) represent ovate-leaved individuals of M.

purpurascens with marsupiform domatia (see discussion under M. purpurascens).

14b. Mecranium axillare subsp. proctori Skean, subsp. nov.--TYPE: JAMAICA. Portland Parish: John Crow Mtns., 1-1.5 mi SW of Ecclesdown, E slope, 1000-1500 ft [305-457 m], 9 April 1954, fl, Proctor 8598 (holotype: NY; isotypes: GH, IJ).

Subspecies haec a subspecies typo differt foliis pilo caespetibus destitutis, ramunculis glabris.

Shrub or small tree with youngest leaves bearing several hairs in axils of junction of midvein and largest secondary veins on abaxial surface of lamina, these mostly caducous. Young twigs glabrous. Fig. 30B.

Distribution and Habitat. Jamaica (Fig 44): low elevation hardwood forests on limestone in the John Crow Mountains; 150-760 m.

ADDITIONAL SPECIMENS EXAMINED. JAMAICA. PORTLAND (all from the John Crow Mountains): Ecclesdown, 1200 ft [366 m], Adams 9088 (MO); ibid., 1750 ft [534 m], Adams 9363 (M); eastern slopes, 500 m, Britton 4129 (NY); NW side of ravine on NE side of road leading NW and then S from Ecclesdown, Goodfriend s.n. (F); eastern slopes of S ends, Harris & Britton 10735 (F, NY, US); along road between Fair Prospect & Hartford (& Ecclesdown), ca 3.3 mi SE of jct. with Rt. A-4 (coastal road), 150 m, Judd 5325 (A, BR, FLAS, G, IJ, JBSD,

NY, S, US); ibid., ca 3.9-4 mi SE of jct. with Rt. A-4, 180 m, Judd 5326 (A, FLAS, IJ, JBSD, NY, S, US); 1.5-2 mi SW of Ecclesdown, 1500-2500 ft [457-762 m], Yuncker 18549 (BM, G, MO, S); NW slope of Joe Hill, 1000-2250 ft [305-686 m], Proctor 10076 (IJ, NY); along road between Fair Prospect & Hartford ca 3 mi N of Ecclesdown, 195 m, Skean 1860 (A, BR, BM, DUKE, E, F, FLAS, G, GOET, IJ, JBSD, L, M, MO, NY, P, S, UC, UCWI, US); ibid., ca 2 mi N of Ecclesdown, 215 m, Skean 1861 (A, BM, BR, FLAS, G, IJ, JBSD, NY, P, S, US); ibid., Skean 1862 (A, BM, BR, FLAS, G, IJ, JBSD, NY, P, S, US); ibid., ca 1 mi N of Ecclesdown, 285 m, Skean 1865 (A, BM, BR, DUKE, F, FLAS, G, GOET, IJ, JBSD, MO, NY, P, S, US); ca 1.3 mi SW of Ecclesdown, 1500-2000 ft [457-610 m], Webster 5568 (A).--ST. THOMAS: Big Level District, SE end of John Crow Mtns., 1500-2000 ft [457-610 m], Proctor 11795 (IJ); ibid., 2200-2500 ft [671-762 m], Webster & Proctor 5542 (A, BM, IJ, S, US), ibid., above Rowlandsfield, ca 2000-2250 ft [610-686 m], Webster et al. 8289 (S); near Mauchivacal [Manchoneal], Wilson 473 (GOET).

Mecranium axillare subsp. proctori is endemic to eastern Jamaica in the region of the John Crow Mountains. This taxon has essentially glabrous twigs, but with at least the youngest leaves bearing hairs on the abaxial surface at the junction of the midvein and two largest secondary veins. The smallest veinlets of dried material of this subspecies do not appear to be raised abaxially when viewed at 50x

magnification. I have named this subspecies for Dr. George R. Proctor, noted authority on the floras of Jamaica and Puerto Rico, who collected the type specimen of this taxon.

14c. Mecranium axillare subsp. urbanianum (Cogn.) Skean, comb. & stat. nov., Mecranium amygdalinum (Desr.) C. Wright var. urbanianum Cogn. in Urban, Symb. Antill. 6: 27. 1909.--TYPE: JAMAICA. [Hanover]: wooded hill NE of Dolphin Head, 20 Mar 1908, fr, Harris 10315 (holotype B, presumed destroyed; isotypes: BM(2)!, F!, NY!, US!).

Shrub or small tree with leaves that appear essentially glabrous beneath, i.e., lacking hairs at junction of midvein and largest secondary veins on abaxial surface. Smallest veinlets often slightly raised abaxially in dried material. Twigs essentially glabrous. Leaves and hypanthia often longer than in the other two subspecies (see Key).

Habitat and Distribution. Jamaica (Fig. 44): hardwood forests on limestone and disturbed areas on the western half of the island; 300-945 m.

ADDITIONAL SPECIMENS EXAMINED. JAMAICA. CLARENDON: Peckham Woods, 2500 ft [762 m]. Harris 11041 (BM, NY, US); Glenwood Springs, along road between Balcarres and Sunbury, 3000-3100 ft [915-945 m], Proctor 35643 (IJ); ibid., ca 3100 ft [945 m], Proctor 36355 (IJ, MO).--HANOVER: Dolphin Head and vicinity, lower slopes, 400 m, Britton 2256 (NY); ibid.,

Britton 2325 (NY(2)); Dolphin Head, 400-500 m, Judd 5301 (FLAS, NY, IJ, US); ibid., 300-350 m, Judd 5308 (A, BM, BR, F, FLAS, G, IJ, JBSD, MO, NY, P, S, US); E slope of Dolphin Head, 1200-1500 ft [366-457 m], Proctor 10433 (IJ, NY, US); ibid., 435 m, Skean 1836 (A, BM, BR, FLAS, G, IJ, JBSD, NY, P, S, US); ibid., 445 m, Skean 1837 (A, FLAS, G, IJ, JBSD, NY, S, US); ibid., Skean 1838 (A, BM, BR, DUKE, E, F, FLAS, G, GOET, IJ, JBSD, L, M, MO, NY, P, S, UC, UCWI, US); ibid., on the top, 535 m, Skean 1839 (FLAS, IJ, NY, S, US); ibid., 515 m, Skean 1847 (FLAS); ibid., 510 m, Skean 1848 (FLAS, IJ); ibid., 340 m, Skean 1857 (FLAS, IJ); ibid., woods on slope and top, 1000-1700 ft [305-518 m], Webster & Wilson 5083 (A, BM, IJ, US).--TRELAWNY: Wilson's Run, ca 2250 ft [686 m], Adams 12412 (UCWI).

Mecranium axillare subsp. urbanianum is endemic to western Jamaica. This glabrous taxon has leaves that lack hairs on the abaxial surface at the junction of the midvein and largest secondary veins. The smallest veinlets of this subspecies usually appear to be slightly raised when viewed under 50x magnification. Plants from populations in Clarendon Parish have much shorter, narrower, leaves with bases that are more rounded than those from the region of Dolphin Head.

Mecranium axillare is a member of the M. multiflorum complex, s.s. The species is very similar phenetically to M. integrifolium, a polymorphic species found on Cuba and

Hispaniola showing similar variation in pubescence and leaf thickness (see Keys), but with generally more lustrous leaves, at least in fresh material. Fertile material of Mecranium axillare is easily distinguished from the other two Jamaican species of the genus: M. purpurascens, and M. virgatum (see Appendix C).

The taxonomic basionym of M. axillare is Cremanium axillare, a name published by Macfadyen (1850) in the second volume of his Flora of Jamaica. Macfadyen died before the volume was widely distributed, but the existence of typeset copies in Jamaica, at Kew, and at Harvard are enough to argue for effective publication. Stafleu and Cowan (1981) point out the problem associated with these names. I reject the argument that this work was not effectively published.

If Macfadyen's names are rejected, the correct basionym for this species would be Ossaea brachystachya Naudin, a name validly published in 1851 (Naudin 1851). Unfortunately, the name O. brachystachya (DC.) Triana is currently applied to a Brazilian species (Wurdack 1962) that has as its basionym Clidemia brachystachya DC., a name validly published by de Candolle in 1828 (de Candolle 1828). Triana (1871) transferred this species to the genus Ossaea 20 years after the original description of O. brachystachya Naudin. Therefore, O. brachystachya (DC.) Triana is a later homonym of O. brachystachya Naudin and cannot be applied to the Brazilian species, which is left without a name if treated in the genus Ossaea. Judd (in press) would treat

the Brazilian taxon as a species in a newly circumscribed genus, Pentossaea.

15. Mecranium septentrionale Skean, sp. nov.--TYPE: HISPANIOLA. DOMINICAN REPUBLIC. Santiago-Puerto Plata Boundary: Cordillera Septentrional, Pico Diego de O'Campo, 1135 m, Skean 1799 (holotype: FLAS; isotypes: A, BM, BR, F, FLAS, G, IJ, JBSD, NY, P, S, US).

Species haec a M. multifloro (Desr.) Triana thecis brevioribus (0.3-0.7 vs. 0.8-1.2 mm) differt.

Shrub or small tree to ca 8 m tall. Twigs slightly to moderately 4-angled, 1.5-2.5 mm in diameter, smooth, essentially glabrous, but youngest buds and nodal ridges often with a few unbranched to irregularly branched and matted multicellular hairs; internodes 1-3.8 (6.7) cm long. Leaf blade ovate, less commonly elliptic, 3.3-5.7 (11.8) cm long, 1.2-2.9 (4.2) cm wide; apex acuminate; base cuneate or slightly decurrent; margin plane or slightly revolute, often strongly so near base, conspicuously serrate in distal ca 3/4; venation suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 1-7 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat or not visible; abaxial surface with midvein and largest pair of secondary

veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins flat, the surface essentially glabrous, but with scattered minute, glandular hairs, and caducous unbranched to irregularly branched and matted multicellular hairs at axils of junction of midvein and conspicuous secondary veins. Petiole 7-11 (21) mm long, essentially glabrous. Inflorescences borne in leaf axils and on leafless nodes below leaves, 1.4-2.5 cm long, 0.6-1.2 cm wide, 1-2 branched, the caducous bracts to ca 1.3 mm long; peduncle 4-8 mm long. Hypanthium slightly obconical or subglobose, 1.1-1.7 mm long, 1.2-1.4 mm wide, very sparsely pubescent with minute glandular hairs, the portion free from ovary 0.5-0.6 mm long; portion of calyx bearing external teeth 0.1-0.2 mm long. Calyx teeth ca 0.15 x 0.15 mm. Calyptra conspicuous in bud, the caducous apiculum to ca 0.15 mm long. Petals white, obovate, 1-1.4 mm long, 0.7-0.9 mm wide, slightly cupped adaxially, spreading; apex rounded, emarginate. Stamens white; proximal segment narrowly ovate, 1-1.2 mm long, 0.3-0.4 mm wide; distal segment narrowly obovate, 1.1-1.2 mm long, ca 0.5 mm wide, the anther sacs 0.3-0.7 mm long, usually opening by a single gaping foramen, septum torn. Ovary inferior, 0.8-1.2 mm long, 0.9-1 mm wide, the apical appendage 0.3-0.4 mm high; style white, straight or slightly curved, 2.7-2.9 mm long, ca 0.3 mm wide; stigma ca 0.4 mm wide, capitate. Berries ca 3 x 3 mm,

Fig. 45. Photograph of Mecranium septentrionale from Pico Diego de O'Campo in the Cordillera Septentrional of the Dominican Republic.

purple-black, glabrous or with a few minute glandular hairs; seeds 0.6-0.7 mm x 0.4-0.5 mm. Fig. 45.

Phenology. Mecranium septentrionale has been collected in flower and fruit from March to September.

Distribution and Habitat. Dominican Republic (Fig. 40): known only from the region of Pico Diego de O'Campo, the highest point (1249 m) in the Cordillera Septentrional of Hispaniola, where it occurs in broad-leaved cloud forest; 1100-1249 m. Common melastome associates include Miconia dielsiana Urban, Miconia septentrionalis, W. Judd & R. Beaman, and Ossaea limoides Urban. The forest on Pico Diego de O'Campo is extremely disturbed below ca 1140 m. Liogier (1978) has published a Florula of Loma Isabel de Torres, a region in the Cordillera Septentrional ca 16 km NNE of Pico Diego de O'Campo. This area is lower in elevation (ca 800 m) and lacks many of the cloud forest species found at Pico Diego de O'Campo, including M. septentrionale.

ADDITIONAL SPECIMENS EXAMINED. HISPANIOLA. DOMINICAN REPUBLIC. PUERTO PLATA/SANTIAGO BOUNDARY (all from the region of Pico Diego de O'Campo, ca 19°35'N, 70°45'E): on the top, Jiménez 4541 (US); 1140 m, Judd 5169 (FLAS, JBSD, NY, US); near the summit, 1100 m, Liogier 12692 (IJ, NY, US(2)); 1140 m, Skean 1800 (FLAS, JBSD); 1145 m Skean 1801 (FLAS, JBSD, NY, S); 1170 m, Skean 1802 (FLAS, JBSD, NY, S, US); 1190 m, Skean 1803 (FLAS, JBSD, NY); on the top, 1250 m, Skean 1808 (FLAS, JBSD); summit, 1249 m, Zanoni & Mickel 25597 (FLAS); 1000-1200 m, Zanoni et al. 26691 (FLAS).

Mecranium septentrionale is a north island Hispaniola member of the M. multiflorum complex, s.s., and is endemic to Pico Diego de O'Campo in the Cordillera Septentrional. This species has a calyptra, obovate, retuse petals, and lacks marsupiforum domatia on the abaxial leaf surface at the junction of the midvein and two largest secondary veins. Thus it can be distinguished easily from M. acuminatum, the other species of Mecranium known from the Cordillera Septentrional. The latter is not known from Pico Diego de O'Campo.

Of Hispaniolan species, M. septentrionale may be most easily confused with M. multiflorum from the Massif de la Salle-Sierra de Baoruco. Both taxa lack impressed tertiary veins and abaxial tufts at the two major vein intersections. However, the anther sacs of M. multiflorum are consistently longer than those of M. septentrionale (0.3-0.7 vs. 0.8-1.2 mm).

Mecranium septentrionale is perhaps most closely related to M. latifolium, a species endemic to Puerto Rico (see discussion under M. latifolium). Generally, flowering shoots of M. latifolium have wider leaves and larger flowers than those of M. septentrionale (see Key), but there is some overlap in leaf width. Flower size, especially as reflected in petal length, appears to be the most important characteristic differentiating these two species. The petals of M. septentrionale are 1-1.4 mm long, while those of M. latifolium are 2-3.4 mm long.

16. Mecranium latifolium (Cogn.) Skean, comb. & stat. nov. Mecranium amygdalinum (Desr.) C. Wright forma latifolium Cogn., Jahrb. Königl. Bot. Gart. Berlin 4: 283. 1886. Mecranium amygdalinum (Desr.) C. Wright var. latifolium (Cogn.) Cogn. in A. & C. DC., Mon. Phan. 7: 982. 1891.--TYPE: PUERTO RICO. Sierra de Luquillo, Mt. Jimenes, fl, 19 Jun 1885, Sintenis 1568 (holotype: BR!; isotypes: BR!, F!, G(2)!, GOET(2)!, GH!, M!, MO!, S!, US!).

Mecranium amygdalinum (Desr.) C. Wright forma longifolium Cogn., Jahrb. Königl. Bot. Gart. Berlin 4: 283. 1886. Mecranium amygdalinum (Desr.) C. Wright var. longifolium (Cogn.) Cogn. in A. & C. DC., Mon. Phan. 7: 981. 1891.--TYPE: PUERTO RICO. Sierra de Yabucoa [Sierra de Cayey], "Cerro Gordo," in mountain woods, fl, 14 Sep 1885, Sintenis 2605 [2615, an apparent mistake, is listed] (lectotype, here designated: BR!; isolectotype US!).

Mecranium amygdalinum (Desr.) C. Wright forma parvifolium Cogn., Jahrb. Königl. Bot. Gart. Berlin 4: 283. 1886. Mecranium amygdalinum (Desr.) C. Wright var. parvifolium (Cogn.) Cogn. in A. & C. DC., Mon. Phan. 7: 982. 1891.--TYPE: PUERTO RICO. Sierra de Juncos, in mountain woods, Guruy, fr, 28 Aug 1885,

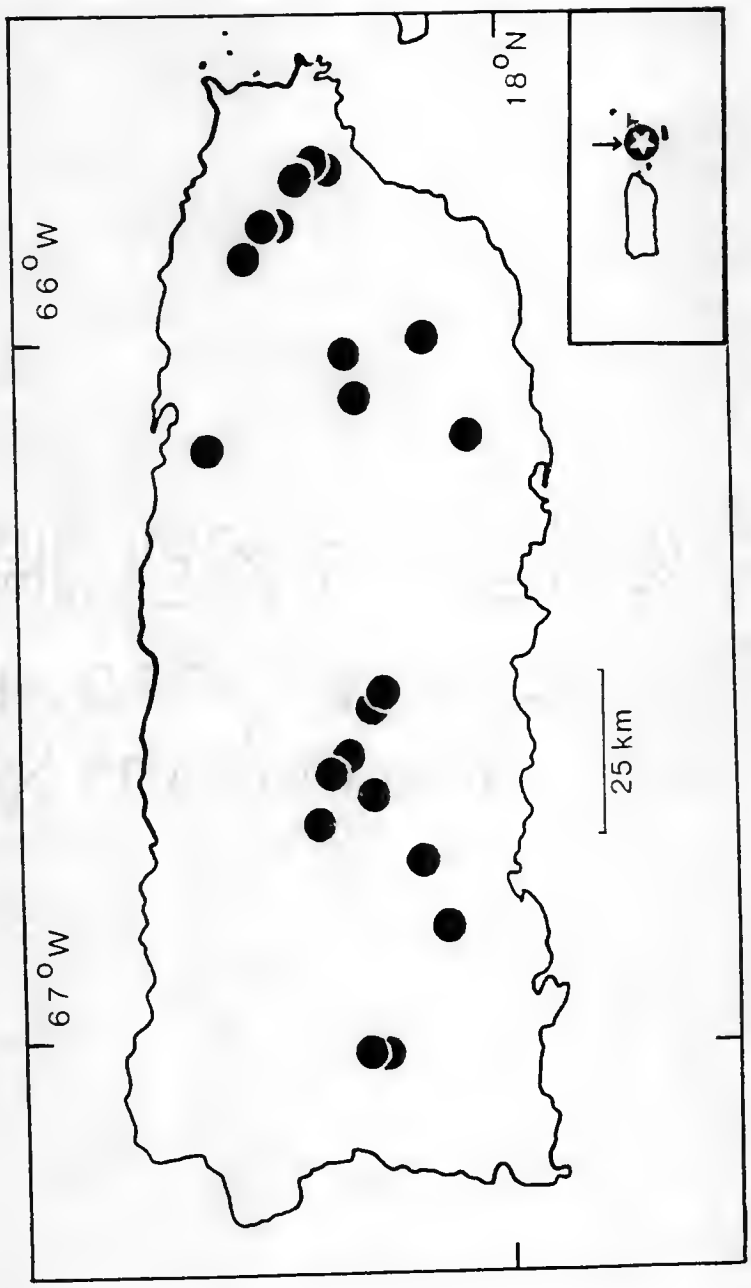
Sintenis 2669 (holotype: BR!; isotypes: BR!, GOET!, US!).

Mecranium amygdalinum (Desr.) C. Wright forma subintegerrimum Cogn., Jahrb. Königl. Bot. Gart. Berlin 4: 283. 1886. Mecranium amygdalinum (Desr.) C. Wright var. subintegerrimum (Cogn.) Cogn. in A. & C. DC., Mon. Phan. 7: 982. 1891.--TYPE: PUERTO RICO. Maricao [W of Cordillera Central], "Montoso," in mountain woods, fr, 20 Nov 1884, Sintenis 280 (lectotype, here designated: BR!; isolectotypes: G!, GH!, GOET!, M!, S!, US!).

Shrub or small tree to ca 8 m tall. Twigs slightly to moderately 4-angled, 1.5-3 mm in diameter, smooth, essentially glabrous, but youngest buds and nodal ridges often with a few unbranched to irregularly branched and matted multicellular hairs; internodes 0.9-3.4 (4.5) cm long. Leaf blade ovate, less commonly elliptic, 5.4-15.4 cm long, 1.5-4.8 (5.7) cm wide; apex acuminate; base cuneate or slightly decurrent; margin plane or slightly revolute, often strongly so near base, obscurely to conspicuously serrate in distal ca 3/4; venation suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 2-16 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat or not

visible; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins flat, the surface essentially glabrous, but with scattered minute, glandular hairs, and caducous unbranched to irregularly branched and matted multicellular hairs at axils of junction of midvein and conspicuous secondary veins. Petiole 7-30 mm long, essentially glabrous. Inflorescences borne in leaf axils and on leafless nodes below leaves, 1.5-3.9 cm long, 0.8-3 (3.9) cm wide, 1-2 branched; peduncle 2-16 mm long. Hypanthium slightly obconical or subglobose, 1.8-2.7 mm long, 2-3.1 mm wide, very sparsely pubescent with minute glandular hairs, the portion free from ovary 0.6-1 mm long; portion of calyx bearing external teeth 0.2-0.5 mm long. Calyx teeth ca 0.3 x 0.3 mm. Calyptra conspicuous in bud, the caducous apiculum to ca 0.2 mm long. Petals white, obovate, 2-3.4 mm long, 1.3-2.6 mm wide, slightly cupped adaxially, spreading; apex rounded, emarginate. Stamens white; proximal segment narrowly ovate, 1.7-2.6 mm long, ca 0.5 mm wide; distal segment narrowly obovate, 1.6-2.6 mm long, ca 0.5 mm wide, the anther sacs 0.4-0.7 mm long, opening by a single gaping foramen, septum torn. Ovary inferior, 1-1.7 mm long, 1.3-2 mm wide, the apical appendage 0.4-0.9 mm high; style white, straight or slightly curved, 3.4-5 mm long, ca 0.5 mm wide; stigma ca 0.6 mm wide, capitate. Berries ca 5.5 x 5.5 mm, purple-black, glabrous

Fig. 46. Distribution of Mecranium latifolium; inset represents St. Thomas.


18°N
66°W
67°W
25 km

or with a few minute glandular hairs; seeds 0.6-0.9 x 0.4-0.5 mm. Chromosome number reported by Nevling (1969) as n = 12.

Phenology. Flowering and fruiting sporadically throughout the year.

Distribution and Habitat. Puerto Rico and St. Thomas (Fig. 46): cloud forests and disturbed areas in the Cordillera Central and Sierra de Luquillo; (400) 800-1100 m. A single early 19th-century collection is known from St. Thomas (Barbier s.n., P), where the species may now be extinct. For detailed discussions of the vegetation of the montane forests of Puerto Rico see Dansereau (1966) and Gleason & Cook (1926).

ADDITIONAL SPECIMENS EXAMINED. PUERTO RICO. Cordillera Central: Maricao State Forest, 600-800 m, Alain 9045 (IJ); ibid., Alain 9336 (A, IJ, NY); near Pico Guilarte, Adjuntas, 1000 m, Alain 9999b (NY); ibid., 800 m, Alain 10012 (DUKE, GH, IJ, NY, US); upper slopes of Mount Morales, near Utuado, E. Britton & Marble 1056 (NY, US); upper slopes of Mount Mandios, near Jayuya, Britton & Cowell 926 (F, NY, US); ibid., Britton & Cowell 929 (F, NY, US); Alto de la Bandera, near Adjuntas, Britton & Shafer 2041 (F, NY, US); Arroyo de los Corchos, between Adjuntas & Jujuya, 800-900 m, Britton et al. 5286 (F, NY, US); Monte Cerrote, near Adjuntas, 900-1050 m, Britton & S. Brown 5408 (NY, US); Monte Torrecilla, 900-1100 m, Britton et al. 5641 (F, NY,

US); valleys near Doña Juana waterfall, Toro Negro, ca 700 m, Britton et al. 6388 (G, NY); Cerro de las Piñas, near Las Cruces, 600-720 m, Britton et al. 6880 (NY); Indiera Baja, N of Yauco, 800-900 m, Britton & E. Britton 7387 (NY); Maricao National Forest, Duke 7015 (MO); Caribbean National Forest, El Toro Negro Division, along Highway 143, 3 mi E of jct. with Highway 149, Hansen et al. 9196 (MO); Monte Alegrillo, Hess 610 (NY); above Villalba, Holdridge 503 (NY); Toro Negro area, 1000-1100 m, Liogier 28294 (NY); Toro Negro, near Doña Juana, 2800 ft [854 m], Little 14811 (BM, NY); N of Villalba, near the station of the University of Puerto Rico in Toro Negro, 18°10'26"N, 66°29'34"W, Mejía et al. 1933 (FLAS); Maricao, Sintenis 280b (BM, BR, L, M); La Lucia, Mt. Cienega, Sintenis 4167 (BR, GH, GOET, NY, US); Jayuya, at San Tabricio, Sintenis 4568 (BR, G, L, M, NY, US); Adjuntas, Sintenis 4661 (BR, G, L, M, P, S); Utuado, Sierra Isabel, Sintenis 6148 (BR, L, M, NY, S); near Bayamon, 1500 ft [457 m], Stahl 456 (L, S); Bayamon, Stahl 556 (G); Toro Negro, along Rd. 143 W of the Estacion Forestal, Stimson 1463 (DUKE, GH, MO, NY, UC, US); Maricao, off Rd. 120 across from entrance to recreational area, Stimson 3423 (DUKE, NY); Yauco, km 22, Vélez 444 (NY); Toro Negro area, Wagner 645 (BM, IJ, S).--Sierra de Cayey: along the Guayama-Cayey road, 700-750 m, Britton et al. 6443 (G, NY, US); Camp Guavate, Cayey, Gregory 78 (NY, US); Cayey, Hess 2958 (NY); Camp Guavate, Cayey, Holdridge 78 (A); ibid., Sintenis 2385 (BR); Yabucoa, Sintenis 5032 (BR);

Cayey to Guayama, Underwood & Griggs 324 (NY); San Lorenzo, Aug 1959, Woodbury s.n. (NY).--Sierra de Luquillo: N slope of El Yunque, Boynton 8229 (NY); Sierra de Naguabo, Barrio de Maizales, 950 m, Britton & Hess 2311 (F, NY, S, US); Catalina-Yunque trail, 400 m, Britton & Bruner 7669 (NY); along Rt. 191 at km 13, D'Arcy 1813 (MO); Luquillo National Forest, Duke 7398 (MO); Caribbean National Forest, 51A Tract, Luquillo Unit, Holdridge 207 (A, NY, US); hillside at km 22.8, S of El Yunque, Howard & Nevling 15479 (A); Pico del Oeste, 1020 m, Howard 16809 (B, BR, DUKE, IJ, MO, S); Mt. Britton, 600-1000 m, Jones 11039 (GH, NY); El Verde, 600-700 m, Liogier 28508 (NY); El Yunque, 3000 ft [915 m], Little 14793 (BM, NY); trail to El Yunque, 2800 ft [854 m], Little 21607 (BM, IJ, NY, US); El Yunque, trail to Pinnaele, Otero 766 (MO); Luquillo National Forest, along the El Verde road (Rt. 966), 500-2000 ft [152-610 m], Proctor 20899 (IJ); El Yunque, 1000 m, Sargent 287 (US); ibid., 600 m, Sargent 569 (US); río Icaco and adjacent hills, 465-720 m, Shafer 3546 (NY); El Yunque, NW side and summit, 3500 ft [1067 m], Shafer 3654 (NY, US); "Piedra Belleta," Sintenis 1179 (BR, US); El Yunque, Mt. Tiedra, Sintenis 5436 (BR, G, GH, GOET, M, NY, S, US); ibid., woods at los Ranchones, Sintenis 5437 (BM, BR, MO); Mt. Britton, 18°18'N, 65°47'W, 2500 ft [762 m], Terborgh 451(71) (NY); km 21 on El Yunque Rd. from Palmer to Florida, Wagner 53 (A); ibid., Wagner 54 (A); along road to East Peak [Pico del Este], Wagner 503 (BM, DUKE, IJ, S); Naguabo, ca 500 m, Webster et al. 8633 (US);

río Grande, trail up Mt. Britton, 800-900 m, Webster & Miller 8688 (DUKE, S, US).--Without specific locality: Delesert s.n., 1827, (photos of sheet from G at F, NY); Richard s.n. (P); Ridly s.n. (G); Sintenis 1179 (BR). ST. THOMAS: without locality, Barbier s.n. (P).

Mecranium latifolium is endemic to Puerto Rico and Saint Thomas, but has not been collected from St. Thomas in recent years. This species is a member of the M. multiflorum complex, s.s. Cladistic studies have not further elucidated its relationship with other members of the group.

The closest relative of this species may be the very similar M. septentrionale of the Cordillera Septentrional of Hispaniola, the mountains nearest Puerto Rico. Mecranium latifolium differs consistently from the latter only in having larger flowers (e.g., petals 2-3.4 mm long vs. 1-1.4 mm long). Although phylogenetic evidence is equivocal, it is certainly possible that Mecranium latifolium may have speciated via peripheral isolation from populations of M. septentrionale on eastern Hispaniola, or that these two species share a very recent common ancestor.

This species is commonly confused with Henriettea macfadyenii (Triana) Alain, a cauliflorous species from Puerto Rico with 4-merous flowers that lack calyptrae. These two species can be differentiated easily, even in vegetative condition. The leaves of H. macfadyenii contain

large, elongate "megastyloid" crystals, which are clearly visible under 10x magnification. Large styloids are lacking in Mecranium, a genus with druses. See Baas (1981) and Judd (in press) for discussions of the taxonomic importance of crystals in the axillary-flowered Miconieae.

There is a fair amount of morphological variation within M. latifolium. Plants from the Sierra de Luquillo tend to have larger, broader leaves, and larger flowers and fruits than those from the Cordillera Central.

Traditionally, this species has been recognized incorrectly under the name M. amygdalinum (see discussion under the latter). Cogniaux (1886) described four forms of M. amygdalinum from Puerto Rico, which he later gave varietal rank (Cogniaux, 1891). To name the phenetically distinct Puerto Rican representative of the M. multiflorum complex, s.s. (see discussion under Phenetic Studies), I have elevated Cogniaux's M. amygdalinum f. latifolium to specific rank. Three of Cogniaux's other forms of M. amygdalinum from Puerto Rico are placed here in synonomy under M. latifolium. Mecranium amygdalinum f. subintegerrimum is lectotypified here because Cogniaux (1886) listed two syntypes in the original publication: Sintenis 280 and Sintenis 280b. I have chosen a specimen of Sintenis 280 at BR as the lectotype of this form. Mecranium amygdalinum f. longifolium is lectotypified here also because of an apparent editorial mistake in the number of the specimen designated as the type of this taxon. Cogniaux

(1886) listed Sintenis 2615 as the type of this form. When he elevated the form to varietal rank, Sintenis 2605 was listed as the type of M. amygdalinum var. longifolium (Cogniaux 1891). Additional specimens were cited for each of the varieties in the later work, but none of the other original numbers were changed. In the numerous Sintenis collections of Mecranium examined for this study, I have seen no Sintenis 2615, and believe that Sintenis 2605 is the number that Cogniaux (1886) intended to cite as the type of M. amygdalinum f. longifolium. Therefore, I have chosen a sheet of Sintenis 2605 at BR as the lectotype of this form.

Eggers and Baron (1879) doubted the occurrence of this species, which they listed as M. amygdalinum, on St. Thomas. I have examined a large-leaved Barbier collection from Paris with this general locality indicated on the label. The species may now be extinct there, but its existence at higher elevations is not improbable. Judd (1981) encountered a similar situation with Lyonia rubiginosa (Pers.) G. Don var. rubiginosa, a cloud forest taxon not collected from that island since 1887.

Dent-Acosta (pers. comm., 21 November 1988) is presently studying the reproductive biology of this species. She reports that the plants produce flowers for two or three months, and after all fruit have ripened, begin flowering again. Her work indicates that there are 2-3 flowering seasons per year. She has seen vireos and migratory

warblers feeding on the fruits, and believes that the species is bird dispersed.

Nevling (1969) reported a chromosome number of n = 12 for this species (as M. amygdalinum) from a population in the Sierra de Luquillo (Howard & Nevling 15960).

According to Little et al. (1974), this species has as its colloquial name "camasey almendro" or "camasey." Little's listing (under M. amygdalinum) included an illustration of a specimen with extremely broad leaves. A beautiful color engraving of M. latifolium can be found in Richard (1812, plate 36). In this illustration the habit corresponds to material from Puerto Rico, and the 5-merous fruit is undoubtedly based on a misobservation incorporated into the original description of Melastoma amygdalina from Hispaniola (see discussion under Mecranium amygdalinum, and Desrousseaux 1797).

17. Mecranium birimosum (Naudin) Triana, Trans. Linn. Soc. 28: 140. 1871. Ossaea birimosa Naudin, Ann. Sci. Nat. Bot. Sér. 3. 17(5): 335. 1851.--TYPE: SAINT DOMINGUE [HISPANIOLA], Hamlet T [Haiti, Massif de la Selle], fl, without date [1788-1791], Beavois s.n. (holotype: P!, photos NY!, F!; isotype: F(fragment)!).

Mecranium torbecianum Urban & E. Ekman in Urban, Ark. Bot. 21A (5): 45. 1927.--TYPE: HAITI. Dépt. du Sud: Massif de la Hotte, western group, near Torbec in high

mountains above La-Mare-Proux, on lateritic soil, 1500-1600 m, young fr, 7 Dec 1925, Ekman H5294 (holotype: B, presumed destroyed; isotypes: IJ, K!, S!, US!).

Shrub or small tree to 2.5 m tall, perhaps larger. Twigs slightly to moderately 4-angled, 2-3 mm in diameter, smooth, essentially glabrous, but youngest buds and nodal ridges often with a few unbranched to irregularly branched and matted multicellular hairs; internodes 1-2.6 (9.7) cm long. Leaf blade very coriaceous, narrowly ovate or elliptic, less commonly obovate, 4.4-8.7 cm long, 1.7-3.2 cm wide, leaves of stump sprouts and sucker-shoots to 14 cm long and 6 cm wide; apex acuminate, less commonly acute or rounded; base cuneate or slightly decurrent; margin obscurely serrate in distal ca 3/4, but usually appearing entire because slightly revolute; venation slightly suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 1-3 (5) mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat or not visible; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins flat or very slightly raised, the surface essentially glabrous, but with some scattered minute,

glandular hairs; marsupiform domatia present on abaxial surface in axils at junction of midvein and largest secondary veins, persistent axillary hair tufts absent. Petiole 6-15 (19) mm long, glabrous. Inflorescences borne in leaf axils and on leafless nodes below leaves, 3.3-7.9 cm long, 2-2.3 cm wide, 1-3 branched; peduncle 14-31 mm long. Hypanthium broadly obconical or subglobose, 1.6-2.6 mm long, 1.8-2.4 mm wide, very sparsely pubescent with minute glandular hairs, the portion free from ovary 0.4-0.7 mm long; portion of calyx bearing external teeth 0.3-0.6 mm long, and with additional narrowly triangular internal projections 0.2-0.7 mm long and 0.1-0.3 mm wide. Calyx teeth ca 0.2 x 0.2 mm. Calyptra conspicuous in bud, the caducous apiculum 0.1-0.3 mm long. Petals white, obovate, 2.1-2.5 mm long, 1.3-2.0 mm wide, slightly cupped adaxially, spreading; apex rounded, emarginate. Stamens white; proximal segment narrowly ovate or elliptic, 1.7-2.2 mm long, 0.4-0.6 mm wide; distal segment narrowly obovate, 1.7-2.2 mm long, 0.5-0.7 mm wide, opening by 2 pore-like slits that extend laterally across apex and down adaxial surface of anther sacs, septum between anther sacs intact, the anther sacs 0.3-0.6 mm long. Ovary inferior, 1.5-1.8 mm long, 1.2-1.8 mm wide, the apical appendage 0.4-1.4 mm high; style white, straight or slightly curved, 2.3-4.1 mm long, 0.3-0.4 mm in diameter; stigma 0.4-0.6 mm wide, expanded. Immature berries ca 6 x 5 mm, greenish, sparsely pubescent

with minute glandular hairs. Mature fruits and seeds not known. Fig. 47.

Phenology. This species has been collected in flower from September to March.

Distribution and Habitat. Hispaniola (Fig. 48): endemic to forests of Pinus occidentalis and disturbed areas that were formerly pine forests in the Massif de la Selle and Massif de la Hotte of Haiti; 1400-1800 m.

ADDITIONAL SPECIMENS EXAMINED. HAITI. DÉPT. DU SUD (all from the Massif de la Hotte): "Ma Blanche," ca 1400 m, Ekman H603 (S); western group, Les Roseaux, Morne Zanite, 1600 m, Ekman H10689 (EHH, GH, NY, S, US); Morne Cavalier, Judd 3713 (FLAS, NY); Morne Formon, Judd 4035 (FLAS).--DÉPT. DU OUEST (all from the Massif de la Selle): Furcy, plateau, Buch 1900 (IJ); Petionville, Furcy, ca 1540 m, Ekman H1828 (GH, NY, S, US); woods along road, Furcy, 1800 m, Liogier 21409 (JBSD, NY); Furcy, Picarda 1502 (BR); ibid., 1540 m, Skean 2031 (A, BM, BR, F, FLAS, G, GOET, IJ, JBSD, L, MO, NY, P, S, US); ibid., Skean 2122 (BR, FLAS, G, IJ, JBSD, NY, P, S. US).--WITHOUT SPECIFIC LOCALITY: Anon. [Beavois?] s.n. (G).

Mecranium birimosum is a species with white flowers having the autapomorphy of an additional whorl of 4 narrowly triangular calyx projections, which are internal to and opposite the internal calyx lobes (see Fig. 47I). Cladistic studies suggest that this south island Hispaniola taxon is a

Fig. 47. M. birimosum (all from Skean 2031 unless indicated otherwise). A. Habit (Skean 2122). B. Leaf, abaxial surface. C. Leaf, abaxial surface. D. Leaf, abaxial surface, close-up showing marsupiform domatia. E. Stamen, lateral view. F. Anther sacs, abaxial view. G. Anther sacs, adaxial view. H. Flower. I. Inner surface of hypanthium; note calyx projections (Ekman 1828).

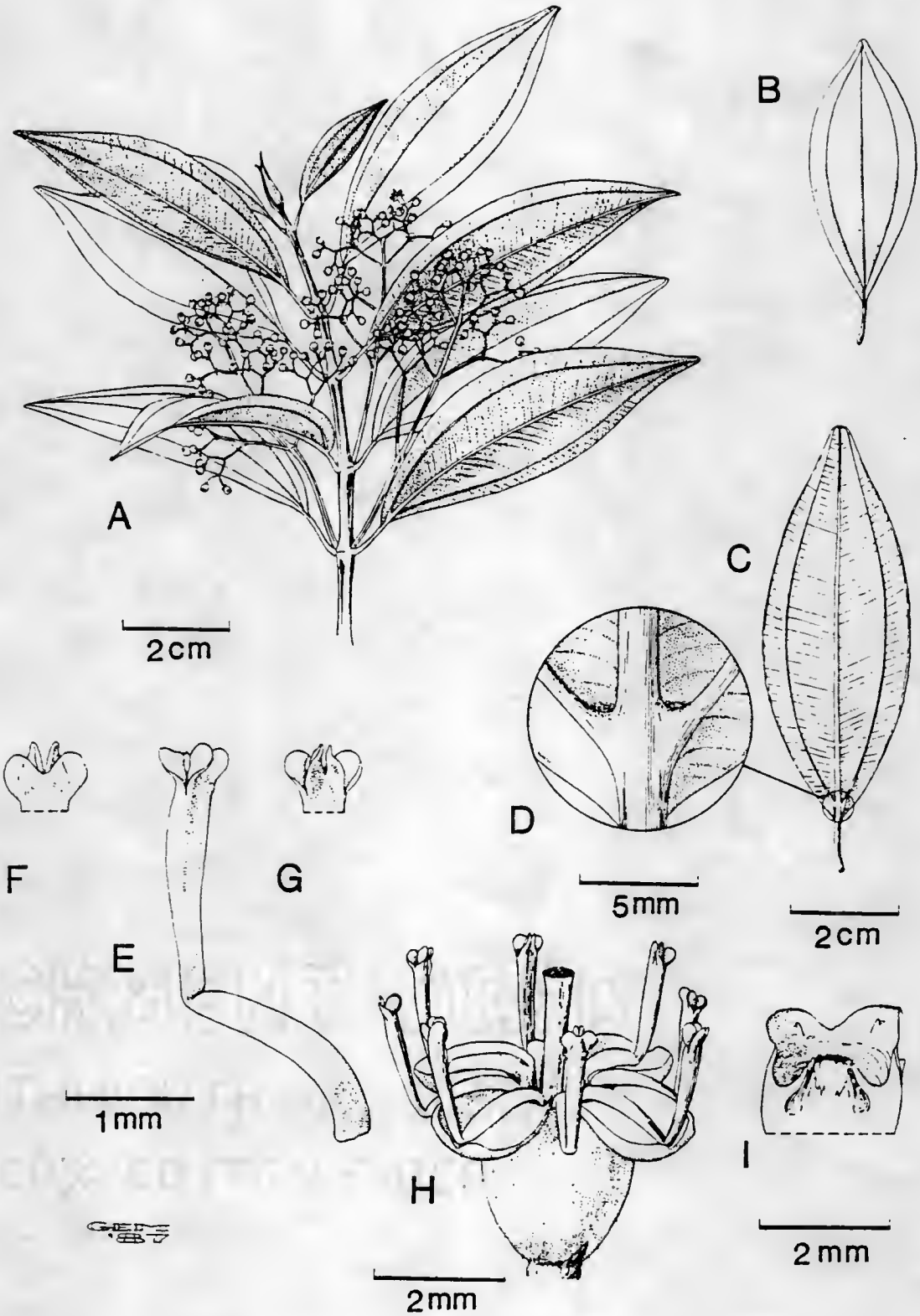
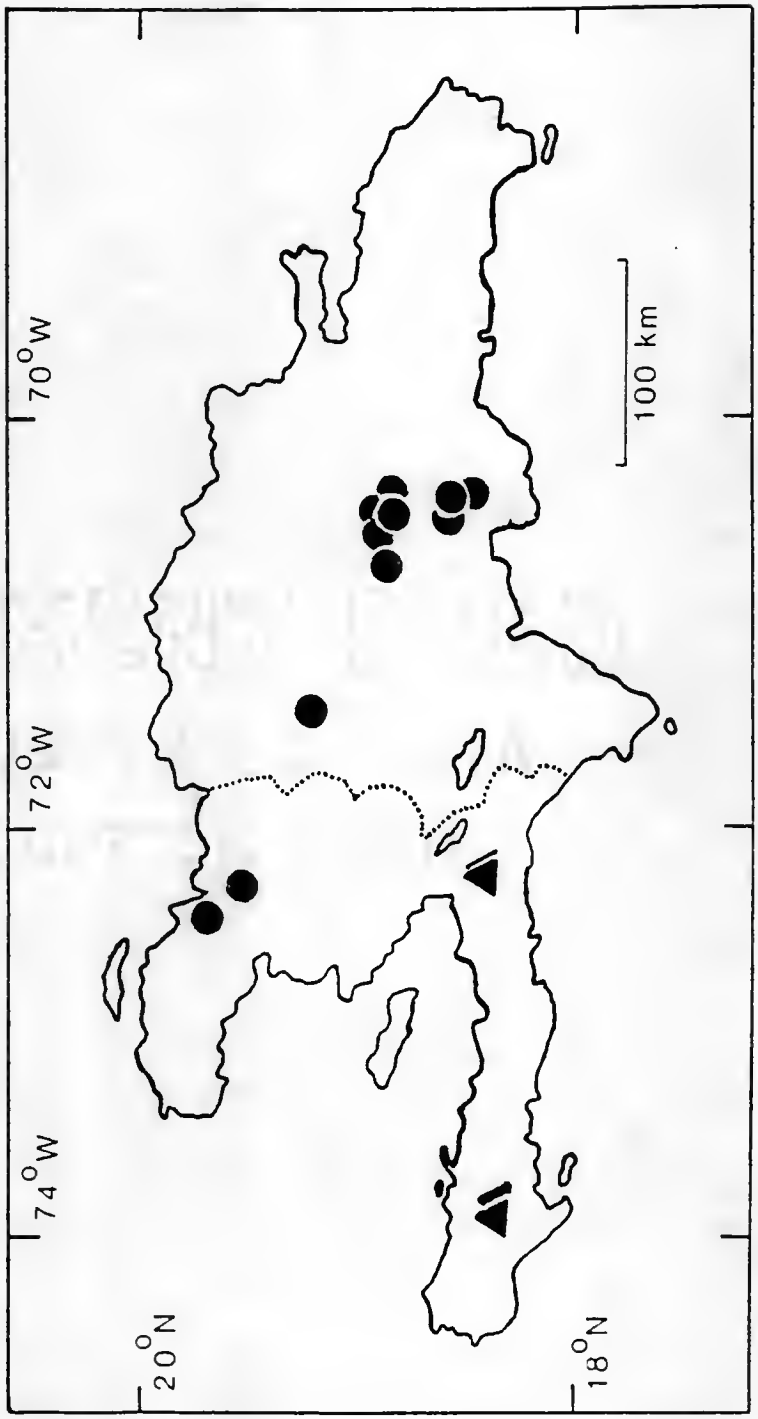

A
2cm
B
C
D
5mm
2cm
F
G
E
1mm
H
2mm
I
2mm

FIG. 48. Distribution of Mecranium birimosum (triangles) and M. puberulum (dots).


74°W
72°W
70°W
20°N
18°N
100 km

basal member of a monophyletic group defined by the synapomorphy of anthers that open by two slits, with the septum between the anther sacs intact. This clade is here termed the M. birimosum complex (see discussion under Phylogeny). Mecranium birimosum may be most closely related to M. microdictyum, a La Hotte endemic and member of this complex, which shares the apomorphy of marsupiform mite domatia at the two major vein intersections on the abaxial leaf surface. The domatia of M. birimosum (Skean 2031, FLAS) were found to contain immature scavenger mites (Oribatulidae). Mecranium birimosum is easily distinguished from M. microdictyum (see Fig. 49), a species with thinner, consistently ovate leaves, and much longer anther sacs (0.3-0.6 mm vs. ca 1.2 mm long).

In sterile condition M. birimosum is most likely to be confused with M. multiflorum (Fig. 39), a sympatric species with smaller flowers and less coriaceous leaves that have strongly revolute margins at their bases. In M. multiflorum these revolute "pseudodomatia" are often inhabited by mites and immature insects. The leaf bases of M. birimosum are typically not revolute, and lack these pseudodomatia. Mite domatia, present in M. birimosum, are lacking in M. multiflorum, and in their place are often located poorly developed tufts of caducous hairs.

Specimens of M. birimosum from the Massif de la Hotte, with elliptic or obovate leaves and more rounded apices, were described by Urban and Ekman (1927) as M. torbecianum,

after Torbec, a nearby settlement. Occasionally similar obovate leaves are found on plants of M. birimosum in the Massif de la Selle. Both obovate and ovate-leaved specimens are now known from the Massif de la Hotte in the region of Morne Formon. In my opinion the two existing obovate-leaved collections (Ekman H5294, Ekman H10689) were taken from the "crowns" of rather large plants, as indicated by Ekman when he described the plant from which Ekman H10689 was taken as a "medium-sized tree." While in the field I have observed similar leaf variation within other species of the genus (e.g., M. alpestre, M. puberulum, M. tricostatum). Often the crown leaves of large individuals are more obovate than those found on smaller specimens.

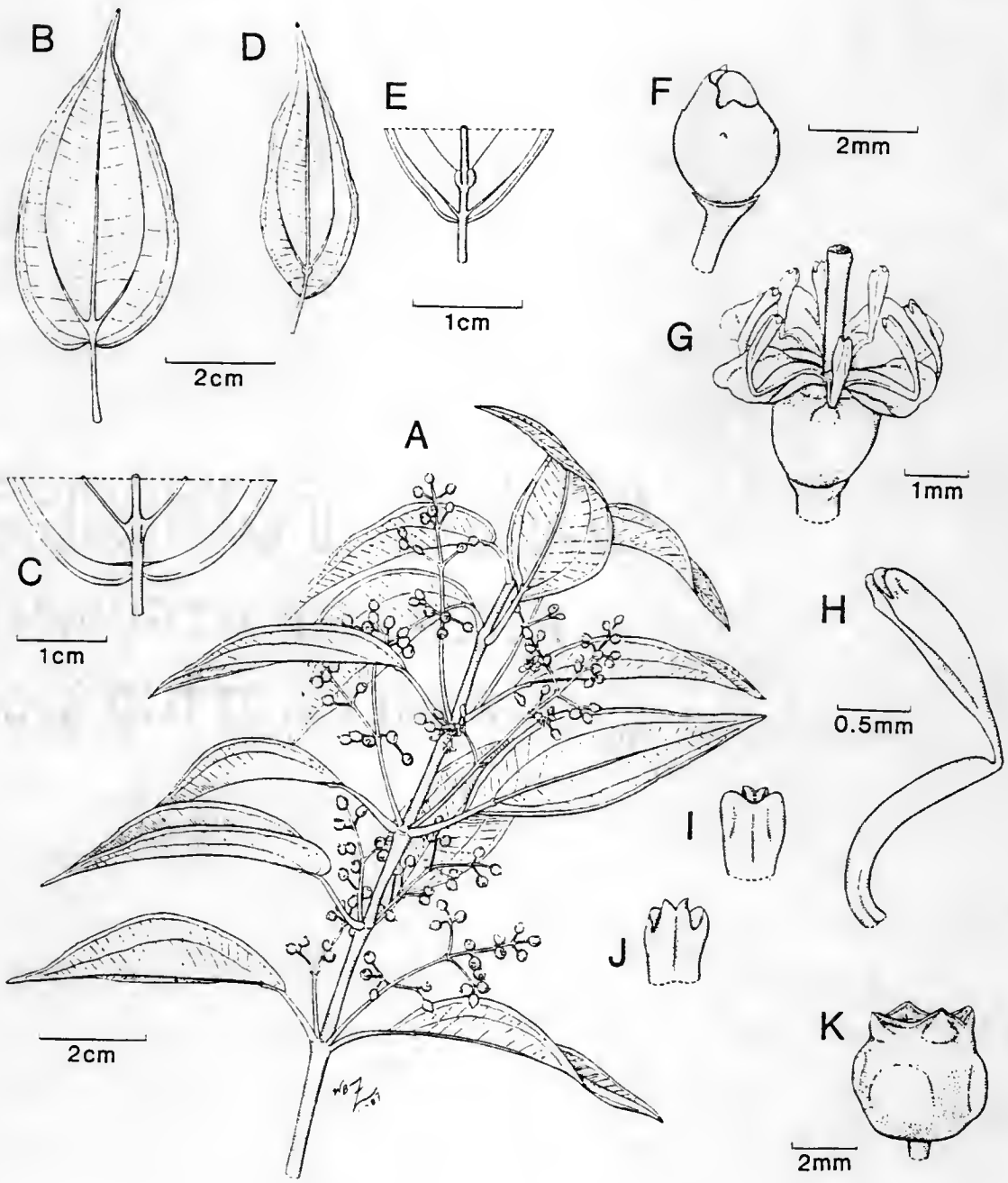
Mecranium birimosum probably derives its name from the red lateritic soil on which it occurs. Today the species is probably very rare in the Massif de la Selle. I was able to locate but a single plant in the muddy, eroded mountains at Furcy, near Port-au-Prince. This area is now essentially devoid of any native forest.

18. Mecranium microdictyum Urban & E. Ekman in Urban, Ark. Bot. 22A(17): 55. 1929.--TYPE: HAITI. Dépt. du Sud: Massif de la Hotte, western group, Les Roseaux, habitat conifer forest, steep mountain slope near pines, ca 1500 m, young fr, 27 Jun 1928, Ekman H10154 (holotype B, presumed destroyed; isotypes: IJ!, S!, US!)

Shrub or small tree to ca 3 m tall. Twigs slightly to moderately 4-angled, 1.5-2 mm in diameter, smooth, essentially glabrous, but youngest buds and nodal ridges often with a few unbranched to irregularly branched and matted multicellular hairs; internodes 1-2.2 (4) cm long. Leaf blade membranaceous or coriaceous, ovate, (3.4) 4.2-8 (10.2) cm long, (1.3) 1.9-3.6 (4.6) cm wide, often plicate and red tinged if plant in full sun; apex acuminate; base slightly cordate or rounded, occasionally appearing cuneate due to revolute margin; margin plane or often revolute near base, appearing ± entire, but actually very obscurely serrate on distal ca three-fourths; venation suprabasal, with 1 or 2 pairs of conspicuous secondary veins (to 3 pairs in juvenile and shade leaves), the largest pair joining midvein 2-6(9) mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat or not visible (rarely dried material of juvenile leaves has tertiary and higher order veins slightly raised above); abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins flat, the surface essentially glabrous, but with some scattered minute, glandular hairs; marsupiform domatia usually present on abaxial surface in axils at junction of

midvein and largest secondary veins, which may form cylindrical or slightly coiled galls to ca 1 mm high when inhabited by thrip larvae, persistent axillary hair tufts absent. Petiole (5) 7-10 (24) mm long, glabrous. Inflorescences borne in leaf axils and on leafless nodes below leaves, 2.6-5 cm long, 0.9-2.3 cm wide, 1-2 branched, the caducous bracts to ca 1.3 mm long; peduncle 7-12 mm long. Hypanthium subglobose, 1.7-1.9 mm long, 2.2-2.4 mm wide, very sparsely pubescent with minute glandular hairs, the portion free from ovary ca 0.7 mm long; portion of calyx bearing external teeth ca 0.2 mm long. Calyx teeth ca 0.2 x 0.2 mm. Calyptra conspicuous in bud, the caducous apiculum ca 0.1 mm long. Petals white, obovate, ca 1.6 mm long, ca 1.3 mm wide, slightly cupped adaxially, spreading; apex rounded, emarginate. Stamens white; proximal segment narrowly ovate, ca 1.7 mm long, ca 0.45 mm wide; distal segment narrowly obovate, ca 1.7 mm long, ca 0.6 mm wide, the anther sacs ca 1.2 mm long, opening by 2 apical-lateral slits, with the septum usually intact. Ovary inferior, ca 1.3 mm long, ca 1.6 mm wide, the apical appendage ca 0.5 mm high; style white, straight or slightly curved, 3-3.4 mm long, ca. 0.5 mm in diameter; stigma ca 0.7 mm wide, capitate. Immature Berries ca 4.6 x 4.2 mm, red-purple, essentially glabrous; immature seeds ca 0.6 x 0.3 mm, tan. Mature fruits and seeds not known. Chromosome number n = 17. Fig. 49.

Fig. 49. M. microdictyum (all from Skean 1523 unless indicated otherwise). A. Habit. B. Leaf, abaxial surface (Judd 3795). C. Leaf base, abaxial surface, close-up showing marsupiform domatia, lacking galls (Judd 3795). D. Leaf, abaxial surface. E. Leaf base, abaxial surface, close-up showing galls. F. Flower bud. G. Flower. H. Stamen. I. anther, abaxial view. J. anther, adaxial view. K. Young fruit.


B
D
E
F
2mm
1cm
2cm
G
A
1mm
C
H
1cm
0.5mm
I
J
K
2cm
2mm

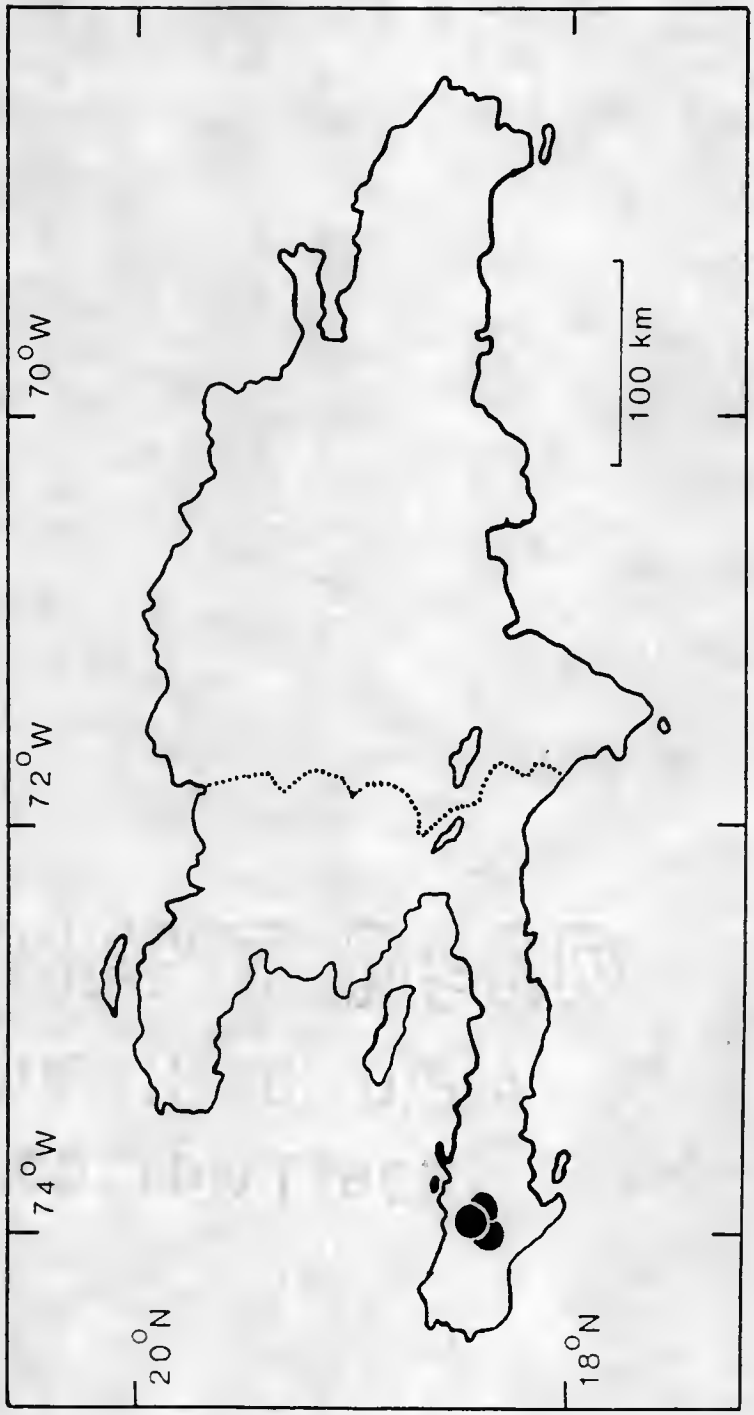
Phenology. Mecranium microdictyum apparently flowers from May through June and probably produces mature berries in early fall.

Distribution and Habitat. Hispaniola (Fig. 50): endemic to the Massif de la Hotte of Haiti. This species occurs in "rak bwa," i.e., low elevation montane hardwood forest on karst, and in a mosaic of broad-leaved cloud forest and pine forest at higher elevations; 800-1780 m.

ADDITIONAL SPECIMENS EXAMINED. HAITI. DÉPT. DU SUD: (all from the Massif de la Hotte, western group), Camp Perrin, N slope of Morne Vanderveld above source Mare Blanche [=La Source, Terre Blanche?], Ekman H5205 (IJ, S); Parc National Pic Macaya (all in disturbed broad-leaved cloud forest unless stated otherwise), bowl-shaped valley on S slopes of Morne Formon, 1620-1660 m, Judd 3795 (FLAS, NY); ibid., Morne Cavalier, just SW of Morne Formon, 1530-1560 m, Judd 4033 (FLAS, US); ibid., N slope of Morne Formon, 1450-1780 m, Skean 1335 (FLAS, S); ibid., Skean 1376 (FLAS, NY); ibid., bowl-shaped valley on S slopes of Morne Formon, 1525 m, Skean 1523 (A, FLAS, G, NY, S, US, IJ, JBSD); road between Camp Perrin and Jérémie, along crest of range, ca 800 m, Skean 2050 (A, FLAS, G, IJ, JBSD, NY, S, US).

Mecranium microdictyum is a basal member of the M. birimosum complex, a clade defined by the synapomorphy of anthers that open by means of two slits, with the septum between the anther sacs intact. As stated previously, M.

Fig. 50. Distribution of Mecranium microdictyum.


74°W
72°W
70°W
20°N
18°N
100 km

microdictyum may be most closely related to M. birimosum. Both species share the apomorphy of marsupiform mite domatia.

Some populations of M. microdictyum have leaves with their abaxial marsupiform domatia inhabited by larval insects, which apparently stimulate the production of swollen or coiled and nearly cochleate galls (to ca 1 mm high) located at the vein axils.

Urban and Ekman (1929), in the original description of this species, stated that the petals were purple, as does Moscoso (1943). This error may have been based on Ekman's handwritten label, now attached to the isotype at S, which stated "pet. and veins purple." Since the authors (probably only Urban) stated in the description that the petals were not seen, it is likely that the abbreviation refers to "petioles" and not "petals." Plants of this species, like most others in the genus, often become heavily tinged with purple under conditions of high sunlight. This is especially noticeable in twigs, petioles, and young leaves.

The specific epithet probably refers to the inconspicuous tertiary veins of the leaf and the reticulum of veinlets, with small areoles, between them.

19. Mecranium puberulum Cogn. in Urban, Symb. Antill. 5: 450. 1908.--TYPE: HAITI. [Dépt du Nord]: Massif du Nord, near Gonäives to Poste Marie Congo, in a shrubby,

sunny place, 900 m, fl, Buch 782 (holotype B, presumed destroyed; isotypes: BR(fragment)!, IJ!).

Shrub or small tree to ca 3.5 m tall. Twigs slightly to moderately 4-angled, 1.5-3 mm in diameter, smooth or slightly tuberculate-roughened, ferrugineous, youngest portions densely and evenly pubescent with brown unbranched to irregularly branched and matted multicellular hairs; internodes (0.8) 1.1-4.5 (5.5) cm long. Leaf blade coriaceous, ovate or elliptic, (2.3) 2.8-9.3 (11.3) cm long, (1.2) 1.5-4.8 (5.4) cm wide, often slightly curved abaxially; apex acuminate, rarely acute or obtuse; base rounded or obtuse, rarely cordate on juvenile plants; margin plane or often slightly revolute near base, serrate on distal ca 3/4, rarely throughout; venation suprabasal, usually with 2 pairs of conspicuous secondary veins, the largest joining midvein 0.5-3 (6) mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein, 2 pairs of secondary veins, and tertiary veins strongly impressed in living material, usually flattening somewhat upon drying; abaxial surface with midvein and 2 largest pairs of secondary veins raised, the intramarginal secondary veins and tertiary veins less raised, the quaternary and higher order veins flat, the surface pubescent with hairs similar to those on stem concentrated on veins and in persistent axillary tufts at junction of midvein and largest secondary veins, minute

glandular hairs also present, marsupiform domatia absent at junction of midvein and largest secondary veins. Petiole (2) 6-26 (33) mm long, densely pubescent with hairs similar to those on stem. Inflorescences borne in leaf axils and on leafless nodes below leaves, (1.1) 1.7-3.2 (3.6) cm long, (0.6) 0.8-2.1 (2.6) cm wide, 1-2 branched, the caducous bracts to ca 4 mm long; peduncle (3) 5-13 (16) mm long densely pubescent with hairs similar to those on stem. Hypanthium slightly obconical or subglobose, 1.5-1.8 mm long, 1.6-2.1 mm wide, moderately pubescent with minute glandular hairs, the portion free from ovary 0.5-0.6 mm long; portion of calyx bearing external teeth 0.2-0.5 mm long. Calyx teeth ca 0.2 x 0.2 mm. Calyptra conspicuous in bud, the caducous apiculum ca 0.2(0.4) mm long. Petals white, obovate, 1.2-1.8 mm long, 1.2-1.4 mm wide, slightly cupped adaxially, spreading; apex rounded, emarginate. Stamens white; proximal segment narrowly ovate, 1.4-1.7 mm long, ca 0.4 mm wide; distal segment narrowly obovate, 1.4-1.7 mm long, ca 0.4 mm wide, opening by 2 pore-like slits that extend laterally across apex and down adaxial surface of anther sacs, septum between anther sacs intact, the anther sacs 0.3-0.5 mm long. Ovary inferior, 0.9-1.2 mm long, 1.3-1.7 mm wide, the apical appendage ca 0.4 mm high; style white, straight or slightly curved, 2.8-3.4 mm long, ca 0.4 mm in diameter; stigma 0.4-0.5 mm wide. Berries ca 4 x 4 mm, purple-black, sparsely to moderately pubescent with

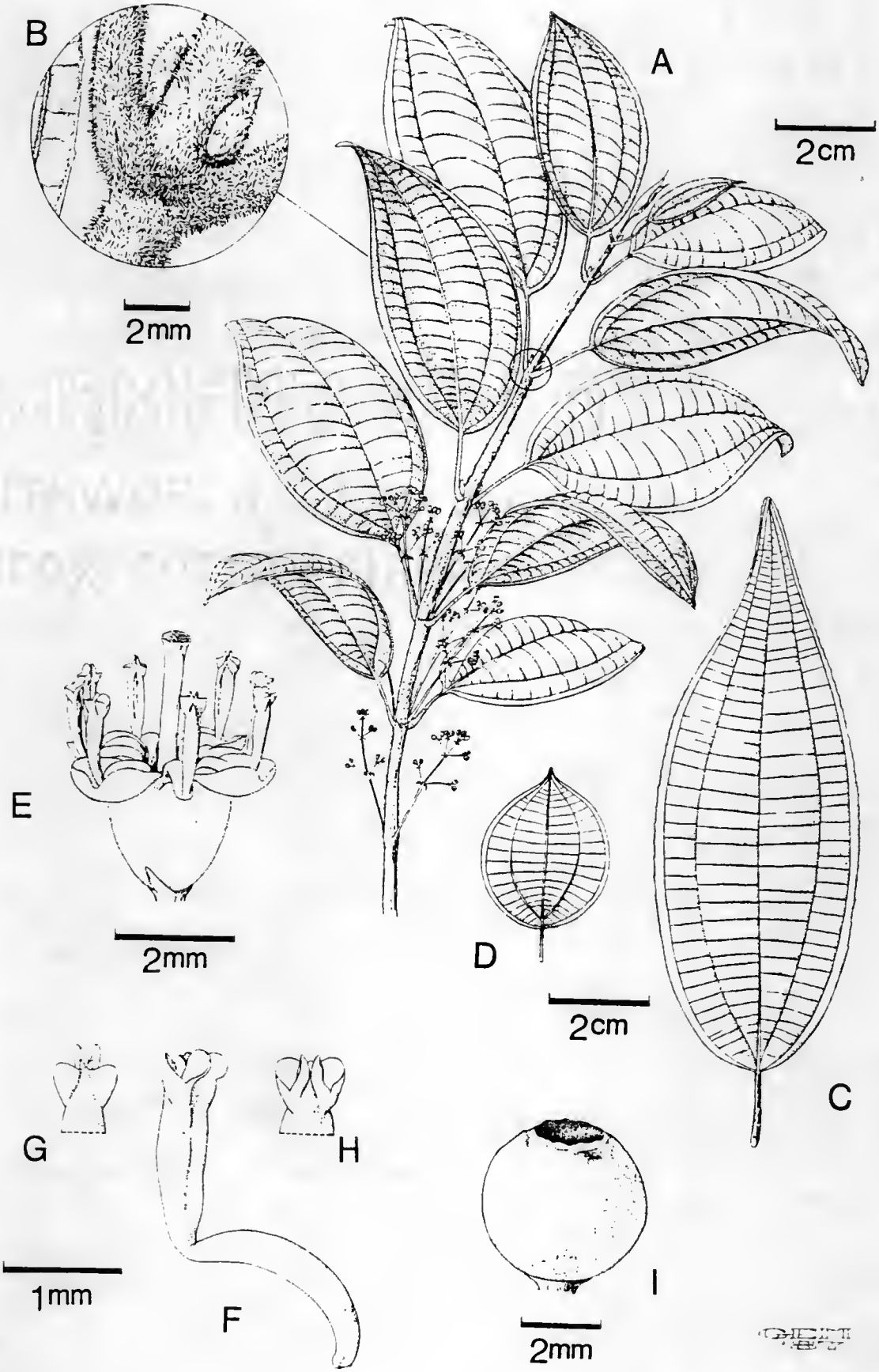
minute glandular hairs; seeds ca 0.6 x 0.3 mm, tan. Fig. 51.

Phenology. Mecranium puberulum has been collected in reproductive condition from May through February, and apparently reaches its peak of flowering from late June through August.

Distribution and Habitat. Hispaniola (Fig. 48): endemic to the Massif du Nord-Cordillera Central where it occurs in broad-leaved cloud forests on lateritic and serpentine soils; 600-1530 m. The species is most common at elevations of 1000-1500 m.

ADDITIONAL SPECIMENS EXAMINED. DOMINICAN REPUBLIC. Cordillera Central: Sierra de Ocoa, San José de Ocoa, Loma del Rancho, ca 1400 m, Ekman H11657 (S); Monción, Lagunas de Cenobi, ca 1100 m, Ekman H12766 (IJ, S); road from Constanza to Jarabacoa, at the summit, ca 1400 m, Ekman H14110 (A, S); lowland forest near La Ciénega, 1100-1200 m, Gastony et al. 408 (GH, NY, US); Alto Casabito, Banao (ca 16 km E of El Río on road from El Río to Jayaco), 1170 m, Judd 5137 (FLAS, JBSD, NY, US); Loma la Golondrina, 1450-1500 m, Judd 5163 (FLAS, JBSD); Loma de la Sal, Jarabacoa, 1200 m, Liogier 11368 (NY, US); ridge E of Loma de la Sal, 1300 m, Liogier 12012 (NY, US); Ciénaga de Manabao, in open woods and along Tablones River, 1000-1100 m, Liogier 12062 (NY, US); Loma de la Sal, 1300-1400 m, Liogier 13337 (NY, US); Alto Casabito, 1300 m, Liogier 17437 (F, NY); along highway on the way up

Fig. 51. Mecranium puberulum (Skean 1832 unless indicated otherwise). A. Habit (Skean 1793). B. Detail of young stem. C. Leaf, adaxial surface (Skean 1831). D. Leaf, abaxial surface (Skean 1765). E. Flower. F. Stamen. G. Anther sacs, abaxial view. H. Anther sacs, adaxial view. I. Fruit (Skean 1833).


B
A
2cm
2mm
E
2mm
D
2cm
C
G
H
1mm
F
I
2mm

to Alto Casabito, 600 m, Liogier 20092 (JBSD, NY); Alto Casabito, 1300 m, Liogier 22875 (JBSD); Loma de la Sal, 1200 m, Liogier 23615 (JBSD); ibid., Liogier 23733 (JBSD); Loma de los Siente Picos, río Verde, Yamasá, 600 m, Liogier 26541 (JBSD); 9 km SE of San José de Ocoa in the village of El Limón, Loma Punto (3-hour hike above from El Limón), 18°29.5'N, 70°28'W, 1350 m, Mejía et al. 544 (FLAS); El Tatón, 13.7 km E of San José de Ocoa on the highway to La Laguna, 18°33'N, 70°27'W, 1100 m, Mejía & Pimentel 23812 (FLAS); Alto Casabito, 1325-1350 m, Skean 1763 (A, BM, BR, DUKE, E, F, FLAS, G, GOET, JBSD, IJ, JE, K, L, M, MO, P, S); ibid., 1165 m, Skean 1765 (A, FLAS, JBSD, NY, S, US); ibid., 1020 m, Skean 1770 (FLAS, JBSD, NY, S, US); Loma la Golondrina, 1530 m, Skean 1787 (JBSD); ibid., 1510 m, Skean 1788 (FLAS, JBSD, NY, US); ibid., 1480 m, Skean 1789 (FLAS, JBSD); ibid., 1470 m, Skean 1790 (A, FLAS, JBSD); ibid., 1450 m, Skean 1792 (FLAS, JBSD, NY, US); ibid., 1410 m, Skean 1793 (BR, F, FLAS, JBSD, MO, NY, S, US); ibid., 1370 m, Skean 1794 (FLAS, JBSD); Alto Casabito, 1000 m, Skean 1831 (FLAS, JBSD); ibid., 1025 m, Skean 1832 (BM, FLAS, G, JBSD, NY, S, US); ibid., Skean 1833 (FLAS, JBSD); ibid., 1315 m, Skean 1834 (FLAS, JBSD, NY, US); San José de Ocoa, 15 km N of the central plaza and 8-10 km from the crossroads of Los Arroyos on the road to Carmona, 18°40'N, 70°32'W, transition zone from broad-leaved to pine forest, 4400-4600 ft [1340-1402 m], Zanoni et al. 21864 (FLAS); above Loma Valdesia, a shoulder of Loma Rodríguez, E of Presa de

Valdesia (on the río Nizao), 18°26'N, 70°18'W, moist shrubby area, 700 m, Zanoni et al. 28316 (FLAS).--HAITI. Massif du Nord: Port-Margot, Morne Maleuore, 800-1000 m, Ekman H2787 (GH, S, US); Bayeux, Morne Brigand, near a small path called "Chemin Brigand," 800-900 m, Ekman H2940 (G, NY, S); vicinity of Marmelade, on summit of mountain E of village, ca 800 m, Leonard 8246 (US); Petit Borgne to Mt. Casse, ca 2000 ft [610 m], Nash 508 (NY); Marmelade, cleared pinelands, ca 3200 ft [976 m], Nash 702 (NY); ibid., Nash 721 (NY); road from Camp No. 1 to La Barrière Couchant, Nash & Taylor 1054 (NY); ibid., 2500 ft [762 m], Nash & Taylor 1068 (NY).

Mecranium puberulum is a pubescent member of the M. birimosum complex that probably is most closely related to M. haemanthum and M. tuberculatum (see discussion under Phylogeny). However M. puberulum is not likely to be confused with these relatively glabrous species, which have red-purple flowers borne exclusively on the old nodes below the leaves.

Mecranium puberulum may be most easily confused with M. ovatum and M. alpestre. All three species have leaves that are approximately the same shape. Mecranium ovatum, endemic to the Sierra de Baoruco of the Dominican Republic, is an essentially glabrous species with leaves very similar in size and vein impression to those of M. puberulum. Generally the latter has leaves with 4 conspicuous secondary

veins, while leaves of M. ovatum have but two. Mecranium alpestre is endemic to the Massif de la Hotte of Haiti, is pubescent like M. puberulum, but has leaves that are generally much smaller (<4 cm long). Well-developed pseudodomatia, formed by the revolute lamina margin near the petiole, are lacking in M. puberulum, but are often found in M. alpestre.

20. Mecranium haemanthum Triana ex Cogn. in A. & C. DC., Mon. Phan. 7: 983. 1891.--TYPE: CUBA. [Guantánamo]: Pinal de St. Ana, 800 m, fl, fr, Apr 1889, Eggers 5176 (lectotype, here designated: M!; isolectotypes: A!, BR!, GOET!, US!).

Shrub or small tree to ca 6 m tall. Twigs strongly 4-angled and ridged, 2-4 mm in diameter, often appearing slightly scurfy due to minute glandular hairs, and often with scattered corky tuberculae, youngest buds and nodal ridges usually with a few unbranched to irregularly branched and matted multicellular hairs; internodes 1.5-4.8 cm long. Leaf blade coriaceous, ovate or elliptic, 6.6-20.6 cm long, 2.5-8.4 cm wide; apex acuminate, less commonly acute; base rounded or slightly cordate; margin usually slightly to strongly revolute, appearing nearly entire, but actually obscurely serrate in distal ca 3/4; venation basal or slightly suprabasal, usually with 2 pairs of conspicuous secondary veins, the largest pair joining midvein 0.5-6 mm

above lamina base, and 1 pair of less conspicuous, intramarginal secondary veins; adaxial surface with midvein, secondary veins, and tertiary veins flat or slightly impressed; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins less raised, the quaternary veins flat or very slightly raised, the smallest veinlets flat, the surface with scattered minute glandular hairs, often concentrated on veins; marsupiform domatia absent on abaxial surface in axils at junction of midvein and largest secondary veins, persistent axillary hair tufts absent. Petiole 10-41 mm long, essentially glabrous. Inflorescences borne exclusively on leafless nodes below leaves, 1.4-5 cm long, 0.9-4.3 cm wide, 1-2 branched; peduncle 4-11 mm long. Hypanthium subglobose or urceolate, ca 3.3 mm long, 2.7-3.2 mm wide, slightly pubescent with minute glandular hairs, the portion free from ovary 1-1.2 mm long; portion of calyx bearing external teeth 0.3-0.5 mm long. Calyx teeth ca 0.3 x 0.3 mm. Calyptra conspicuous in bud, the caducous apiculum to ca 0.15 mm long. Petals red-purple, obovate, 2.9-3.3 mm long, 2.7-3.6 mm wide, strongly cupped adaxially, spreading; apex rounded, emarginate. Stamens mostly red-purple, with anther sacs whitish; proximal segment ± elliptic or narrowly ovate 3.2-3.4 mm long, ca 0.8 mm wide; distal segment narrowly obovate, 2.9-3.5 mm long, 0.6-0.8 mm wide, the anther sacs 0.9-1.3 mm long, opening by 2 apical-lateral slits, the septum intact. Ovary 3/4 to fully

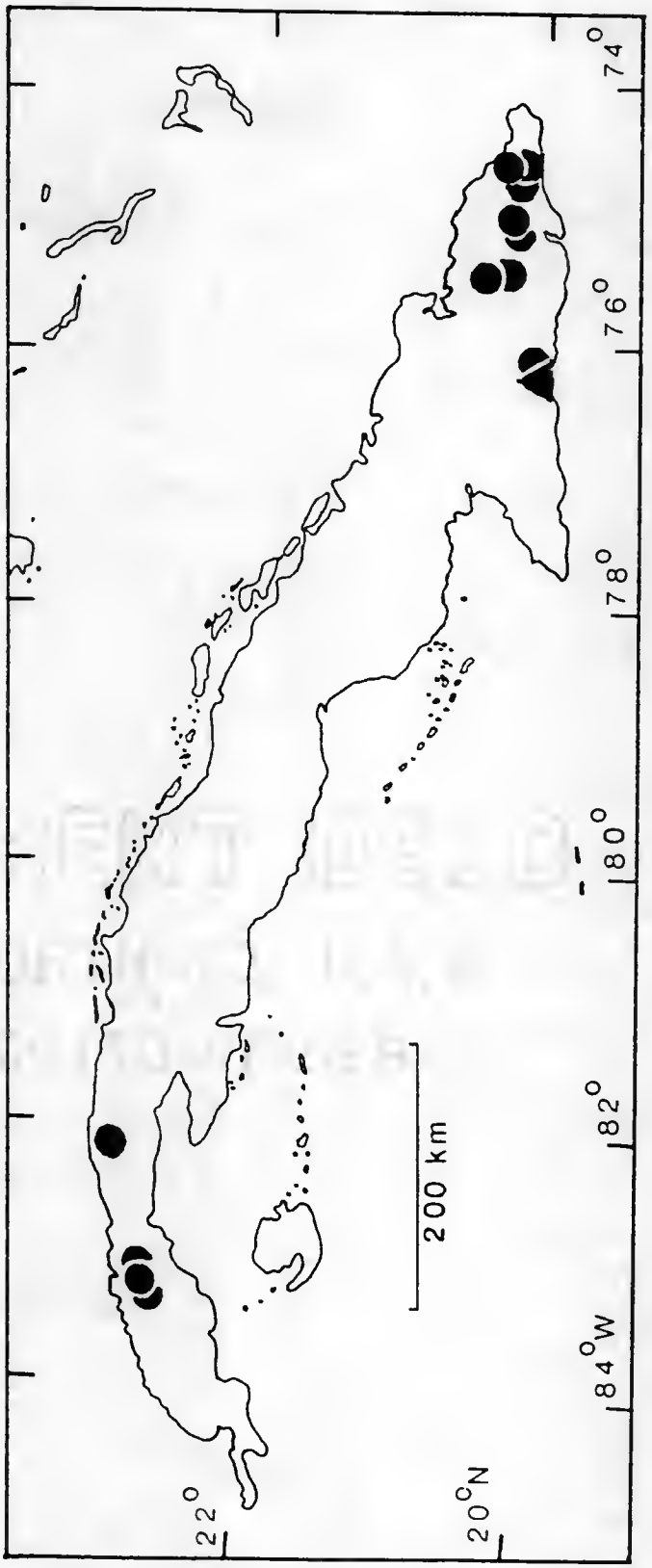
inferior, ca 2.3 mm long, 2.2-2.6 mm wide, the apical appendage 1-1.3 mm high; style red-purple, straight or slightly curved, 5.8-6.3 mm long, ca 0.6 mm wide; stigma 0.5-0.7 mm wide, expanded. Berries not seen.

Phenology. Known to flower from November to June, with peak flowering from December through March.

Distribution and Habitat. Cuba (Fig. 52): moist thickets, broad-leaved forests on limestone, and broad-leaved cloud forests in the Cordillera de Guaniguanico, Cordillera del Turquino, Cuchillas de Baracoa, Cuchillas de Toa, Meseta del Guaso, Sierra del Cristal, Sierra de Imías, and Sierra del Purial, especially along streams. A single population is known from Loma de la Coca in the Alturas de la Habana Matanzas; (200) 500-1300 m.

ADDITIONAL SPECIMENS EXAMINED. CUBA. GUANTANAMO: at the foot of the slope SW of El Yunque de Baracoa, 200-500 m, Bisse & Köhler 5238 (HAJB); Sierra de Imías, Loma de la Maestra, near Yamagua, Bisse et al. 39534 (HAJB); Baracoa, Arroyo Blanco, hill E of the head of the stream, Bisse et al. 39861 (HAJB); San Antonio del Sur, Puriales de Cayerí, Sierra del Purial, near Orroyen, Bisse et al. 47361 (HAJB); Maisí, between Cantillo & los Nararyos, 600 m, Bisse et al. 47606 (HAJB); Palenque, Bernardo, Sierra de Frijol [Cuchillas de Toa], NW of Pico Galano [Pico Galán], 800 m, Bisse et al. 49736 (HAJB); Imías, Sierra de Imías, Tres Piedras, 800-900 m, Bisse et al. 52065 (HAJB); ibid., Loma

Fig. 52. Distribution of Mecranium haemanthum (dots) and M. tuberculatum (triangle) on Cuba.


74°
76°
78°
80°
82°
84°W
22°
20°N
200 km

de Tres Piedras, 1000-1100 m, Bisse et al. 52339 (HAJB); Cuchillas de Baracoa, El Yunque, at the top, Ekman 3955 (S); La Prenda, Guantánamo, Hioram 4175 (GH, IJ); La Perla to Santa Ana, 660 m, Shafer 8616 (NY, US); Cuchillas de Baracoa, El Yunque, Underwood & Earle 1261 (NY);--LA HABANA: Campo Florido, Loma de la Coca, Bisse et al. 37837 (HAJB).--HOLGUIN/SANTIAGO DE CUBA, BOUNDARY: Mayari, Sierra del Cristal, slope S of El Cristal, Alain et al. 5548 (GH, HAJB); Sierra del Cristal, headwaters of río Lebisa [Levisa], 600-700 m, Ekman 15878 (BM, G).--PINAR DEL RIO: banks of La Plata rivulet, Rangel, 500 m, Alain 706 (NY, HAC); ibid., Alain 19533 (NY); slopes N of Pan de Guajaibón, Las Pozas, Alain & Acuña 2966 (HAJB, NY); Los Palacios, San Diego de los Baños, arroyo del Fuego, near Bermejales, 200 m, Bisse et al. 46283 (HAJB); Minas de Matahambre, Ceja de Francisca, Bisse et al. 51468 (HAJB); Santa Catalina, Caldwell & Baker 7067 (F, GH, S); Sierra de los Organos, near El Rosario, 400 m, Ekman 13839 (S); ibid., valley of Río Santa Cruz, Ekman 16392 (NY, S); siliceous rocks at base of Sierra de San Francisco, Ekman 18212 (S).--SANTIAGO DE CUBA: tributary of the Peladero, Alto de la Valeuzuela, López 2141 (HAJB); Sierra Maestra, along río Peladero, below Aserradero San Antonio de los Cumbres, ca. 1300 m, Morton 9543 (US); Sabanilla to Yamuri Arriba [Mayari Arriba], Shafer 8423 (NY, US); Yamuri Arriba to Bermejal, Shafer 8443 (NY).--WRIGHT COLLECTIONS: Monte Libano (Apr 11, 1861), Viñales (Jan 27, 1863 or 1864), Loma del Gato (Dec 11,

1860), Monte Verde (Jul 19, 1859), Wright 1218 (BM, BR, G, GH, GOET, MO, NY, P, S, UC, US).

Mecranium haemanthum is a purple-flowered, cauliflorous Cuban species in the M. birimosum complex most closely related to M. tuberculatum, a species of the Cordillera del Turquino of eastern Cuba and south island Hispaniola. Mecranium haemanthum exhibits a discontinuous distribution, occurring in the mountains of La Habana and Pinar del Río provinces in the west, and in the mountains of Gramna, Guantánamo, Holguín, and Santiago de Cuba provinces in the east. Having a relatively broad geographical and elevational distribution, it is not surprising that M. haemanthum exhibits a great deal of morphological variation in the characters of leaf size and shape. Plants from populations on western Cuba tend to have longer leaves with more acuminate apices than plants from populations on the eastern part of the island. See Alain (1957) for a photograph of a plant from western Cuba.

Plants of M. haemanthum usually have twigs that are essentially smooth or less commonly with a fine scurfiness due to the presence of numerous minute glandular hairs. Scurfy twigs are uniformly present in M. tuberculatum, a species with shorter, broader leaves with more rounded apices (see Key and Appendix B).

In order to assess the variation in leaf characters, a Principal Components Analysis (PCA) was conducted using leaf

data for eastern and western populations of M. haemanthum, and Cuban and Hispaniolan populations of M. tuberculatum. The morphological gaps obtained with the nine characters surveyed confirmed the recognition of M. haemanthum and M. tuberculatum as distinct species, but no subspecific taxa could be circumscribed clearly (see discussion under Phenetic Studies).

Mecranium haemanthum was confused by earlier botanists with M. virgatum, a Jamaican endemic that has white flowers borne more or less exclusively on old wood below the leaves. Plants of the two species may have similar leaves, but M. virgatum has white flowers with stamens that open by a gaping foramen (vs. 2 pore-like slits in M. haemanthum), and twigs that are moderately 4-angled, lacking the conspicuous longitudinal ridges of M. haemanthum. Grisebach (1866) cited the collection Wright 1218 (M. haemanthum) under the name Cremanium virgatum (Sw.) Griseb. Charles Wright (1869) corrected Grisebach's error and gave the Cuban plants the name Mecranium coccineum, a nomen nudum. Triana (1871) coined the name Mecranium haemanthum for these plants, presumably for their red-purple flowers, but like Wright, failed to present a description. Later, the species name was published validly by Cogniaux (1891), who cited the collections Wright 1218 and Eggers 5176 as syntypes.

I have chosen a sheet of Eggers 5176 at M as the lectotype for this species in order to avoid the confusion surrounding the "mixed collections" of Charles Wright that

were distributed under a single number by Asa Gray (see discussion under M. obtusifolium). In the case of M. haemanthum, Wright 1218 represents four different collections, including populations from both eastern and western Cuba. I have listed these in the specimen citations as "Wright Collections" because of the difficulty in determining the geographical origin of each specimen.

21. Mecranium tuberculatum Urban, Repert. Spec. Nov. Regni Veg. 14: 339. 1916.--TYPE: HAITI. [Dépt. du Sud]: Massif de la Selle, in mountains near Furcy, fl, Nov 1896, Picarda 1516 (holotype: B, presumed destroyed; isotypes: BR!, GH(fragment)!, S!).

Shrub or small tree to ca 3 m tall. Twigs strongly 4-angled and ridged, 3-4 mm in diameter, often slightly to strongly roughened-tuberculate due to minute glandular hairs, youngest buds and nodal ridges often with a few unbranched to irregularly branched and matted multicellular hairs; internodes 1.8-5 cm long. Leaf blade coriaceous, ovate or elliptic, less commonly obovate, 4.8-13.1 cm long, 3.8-9.1 cm wide, often slightly curved abaxially; apex short-acuminate or acute to obtuse; base slightly cordate or rounded, less commonly slightly decurrent; margin usually slightly to strongly revolute, especially near base, appearing nearly entire, but actually obscurely serrate in distal ca 3/4; venation basal or slightly suprabasal,

usually with 2 pairs of conspicuous secondary veins, the largest pair joining midvein 0-3 mm above lamina base, and 1 pair of less conspicuous, intramarginal secondary veins; adaxial surface with midvein, secondary veins, and tertiary veins slightly to strongly impressed in living material, often flattening upon drying; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins less raised, the quaternary veins very slightly raised, the higher order veins flat, the surface essentially glabrous, but with some scattered minute, glandular hairs; marsupiform domatia absent on abaxial surface in axils at junction of midvein and largest secondary veins, persistent axillary hair tufts absent. Petiole 8-21 mm long. Inflorescences borne exclusively on old leafless nodes below leaves, 2.8-7.4 cm long, 1.5-4.5 cm wide, 1-2 branched; peduncle 6-25 mm long. Hypanthium subglobose or urceolate, 2.6-2.8 mm long, 2.3-2.8 mm wide, moderately pubescent with minute glandular hairs, the portion free from ovary 0.8-1.2 mm long; portion of calyx bearing external teeth 0.3-0.5 mm long. Calyx teeth ca 0.4 x 0.4 mm. Calyptra conspicuous in bud, the caducous apiculum to ca 0.15 mm long. Petals red-purple, obovate, 2.7-3.1 mm long, 2.4-3 mm wide, strongly cupped adaxially, spreading; apex rounded, emarginate. Stamens red-purple with anther sacs whitish; proximal segment narrowly ovate, ca 2.9 mm long, ca 0.8 mm wide; distal segment narrowly obovate, ca 2.8 mm long, ca 0.8 mm wide,

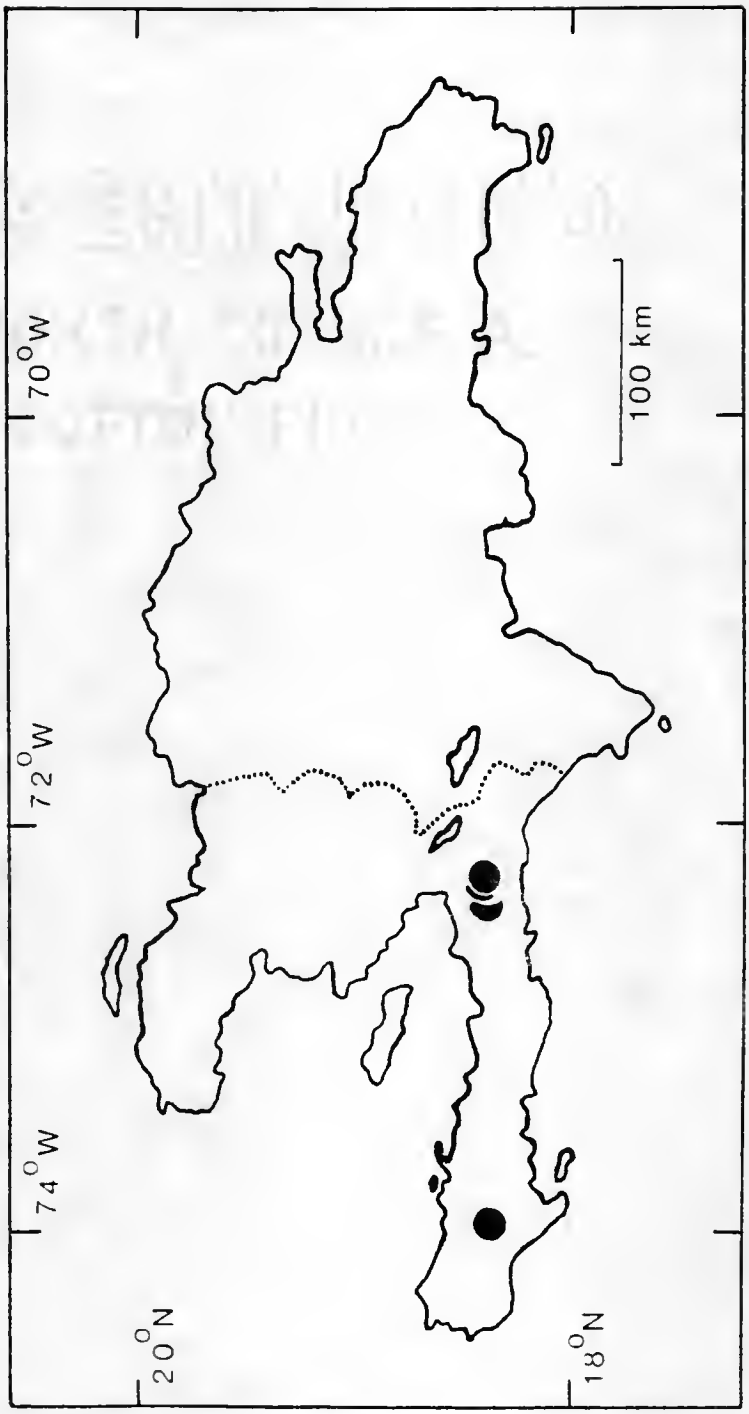
the anther sacs whitish, ca 0.9 mm long, opening by 2 apical-lateral slits, septum intact. Ovary ca 3/4 to fully inferior, 1.8-2.2 mm long, 1.5-2.1 mm wide, the apical appendage 0.5-0.8 mm high; style red-purple, straight or slightly curved, ca 5.3 mm long, ca 0.6 mm wide; stigma ca 0.6 mm wide, expanded. Berries not known.

Phenology. Mecranium tuberculatum is known in flower from November through February, and probably bears mature fruits through March and April.

Distribution and Habitat. South island Hispaniola (Fig. 53) and eastern Cuba (Fig. 52): found in broad-leaved cloud forests of the Massif de la Selle and Massif de la Hotte of Haiti (1200-2225 m), and in the Cordillera del Turquino of Cuba (700-1000 m). See Judd (1987) for a discussion of the best remaining forests of these areas in Haiti, and Borhidi and Muñiz (1986), Seifriz (1943), and Smith (1954) for general accounts of forests in the Sierra Maestra.

ADDITIONAL SPECIMENS EXAMINED. CUBA. GRANMA: valley of Arroyo Escondido, 700-1000 m, Bisse et al. 37337, 37592, 37607 (HAJB).--SANTIAGO DE CUBA: Sierra Maestra, Arroyo Jiménez, 600-900 m, Ekman 14817 (S). HAITI. DÉPT. DU OUEST: Massif de la Selle, Petionville, Lamarque, ca 1400 m, Ekman H1724 (IJ, S); Port-au-Prince, Morne Malanga, ca 1200 m, Ekman H5470 (A, G, IJ, NY, S).--DÉPT. DU SUD: Massif de la Hotte, Torbec, top of Morne Formon, 2225 m, Ekman H7475 (S);

Fig. 53. Distribution of Mecranium tuberculatum on Hispnaiola.


74°W
72°W
70°W
20°N
18°N
100 km

ibid., ridge of Morne Formon, 1830-1860 m, Skean 1542 (FLAS, NY).

Mecranium tuberculatum is the sister species of M. haemanthum. Both species share the apomorphies of ridged stems and purple flowers with reflexed petals borne exclusively on old wood below the leaves. The two species are relatively derived members of M. birimosum complex, a clade defined by the synapomorphy of anthers opening by 2 slits, with the septum between the anther sacs remaining intact (see discussion under Phylogeny).

Mecranium tuberculatum differs from M. haemanthum in having stems that are more roughened, and leaves that are proportionally shorter and broader (1-2x as long as wide vs. 2-3.5x as long as wide). The leaves of M. tuberculatum have apices that are short-acuminate to obtuse, while those of M. haemanthum are usually acuminate. In fresh material, the leaves of M. tuberculatum have their major veins impressed above, while those of M. haemanthum are apparently flat.

Plants of M. tuberculatum from high elevations of the Massif de la Hotte tend to have smaller leaves than those from lower elevation populations in the Massif de la Selle and Sierra Maestra.

The specific epithet refers to the roughened-tuberculate young stems found in this species.

22. Mecranium obtusifolium Cogn. in A. & C. DC., Mon. Phan. 7: 983. 1891.--TYPE: CUBA. [Pinar del Río]: Western Cuba, Arroyo Caballo, fr, 14 Sep [1860 or 1861], Wright 2518, in part, collection "A," see discussion below (lectotype, here designated: G!; isolectotypes: BR!, GH(right half of sheet)!, GOET!, P!).

Shrub or small tree to ca 5 m tall. Twigs slightly to moderately 4-angled, 1-2 mm in diameter, smooth, essentially glabrous, but youngest buds and nodal ridges sometimes with a few unbranched to irregularly branched and matted multicellular hairs; internodes 1.2-1.9 cm long. Leaf blade coriaceous, elliptic or ovate, 3-6.1 cm long, 1.3-3.1 cm wide; apex acute or obtuse; base ± obtuse or rounded, sometimes cuneate due to strongly revolute margin; margin slightly to strongly revolute, especially near base, very obscurely serrate in distal ca 3/4; venation ± basal, with 1 pair of conspicuous secondary veins joining midvein 0.5-1 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat or not visible; abaxial surface with midvein and secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins flat, the surface essentially glabrous, but with some scattered minute, glandular hairs, especially at

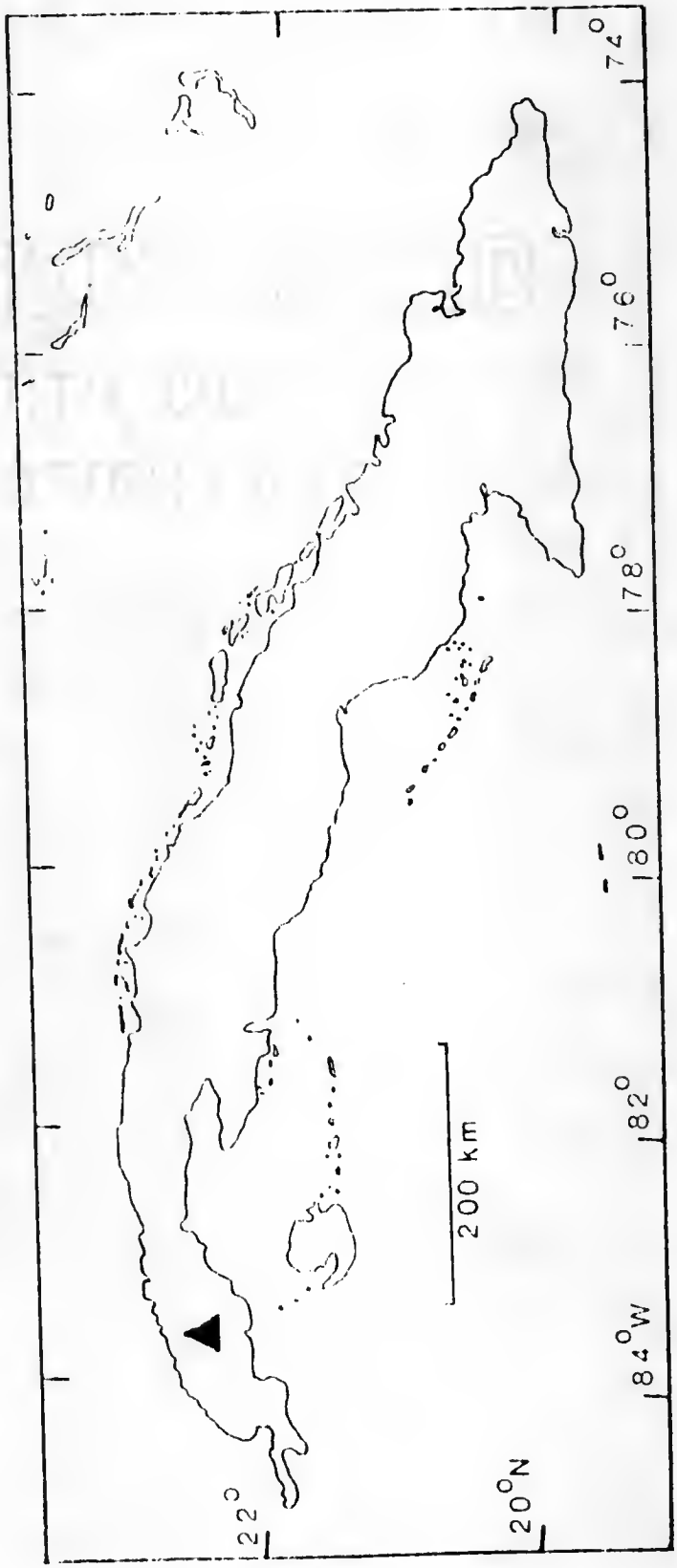
junction of midvein and largest secondary veins; marsupiform domatia and well-developed axillary hair tufts absent from junction of midvein and largest secondary veins. Petiole 6-21 mm long, glabrous. Inflorescences borne in leaf axils and on leafless nodes below leaves, 1.6-3 cm long, 0.9-2.2 (4.5) cm wide, 1-2 branched; peduncle 4-6 mm long. Flowers poorly known, with calyptrate buds. Petals white?, obovate, with a distinct apical notch. Stamens white?; proximal segment narrowly ovate, ca 1.4 mm long, ca 0.4 mm wide; distal segment narrowly obovate, ca 1.3 mm long, ca. 0.3 mm wide, the anther sacs ca 0.5 mm long, probably opening by means of a single gaping foramen, with the septum between the anther sacs torn. Berries ca 6 x 6 mm, purple-black, glabrous or with a few minute glandular hairs, strongly constricted near apex; calyx teeth ca 0.5 x 1.2 mm; seeds ca 0.6 x 0.3 mm.

Phenology. This species is known to produce flower buds in December and fruits in September and January

Distribution and Habitat. Cuba (Fig. 54): western Cuba, apparently limited to Pinar del Río province; elevation unknown.

ADDITIONAL SPECIMENS EXAMINED: CUBA. PINAR DEL RIO: San Andres, Las Catalinas zone, Bisse et al. 41602 (HAJB); Guane, vicinity of Laguna Cordero, Bisse et al. 42214 (HAJB).

Fig. 54. Distribution of Mecranium obtusifolium.


74°
176°
178°
180°
82°
84°W
22°
20°N
200 km

Mecranium obtusifolium is glabrous species for which complete flowering material is not known, and was omitted from the cladistic analysis for this reason. A single specimen having very young flower buds, and one old flower lacking petals, was observed during a brief visit to HAJB. The stamen measurement above is based upon a single stamen, which I was allowed to bring back to FLAS for measurement. The calyptrate flower buds and obovate anthers with reduced anther sacs on this specimen place this species in sect. Mecranium. It is likely a member of the M. multiflorum complex, s.s. The relatively strongly constricted fruits of M. obtusifolium are similar to those of M. racemosum, a pubescent species that is also endemic to western Cuba, and also has as its type Wright 2518.

Mecranium obtusifolium was described by Cogniaux (1891) from material collected in Cuba by Charles Wright and distributed under the number Wright 2518 by Asa Gray. Unfortunately, the sheets distributed under this number comprise three different collections and two different taxa.

I have designated these three collections alphabetically. Collection "A" is glabrous material in fruiting condition collected at "Arroyo Caballo" on September 14 [1860 or 1861]. Collection "B" is densely pubescent material in flowering condition collected at La Palina on July 4 [1862-1864]. Collection "C" is pubescent to nearly glabrous material in immature fruiting condition collected at Pinal Rangel on Aug 6 [1862]. Collection "A"

is the material described as Cogniaux as M. obtusifolium. Collections "B" and "C" appear conspecific and are recognized correctly under the name M. racemosum. Collection dates and their correspondence to dried specimens were determined by associating Wright's handwritten labels with the dried plants on the sheets where they are now attached. The Wright label for collection "A" is attached to a sheet at GH. The labels for "B" and "C" are attached to separate sheets at GOET. The approximate years of collection [stated in brackets] for the entities of Wright 2518 were determined by study of Wright's itinerary as outlined by Underwood (1905) and Howard (1988).

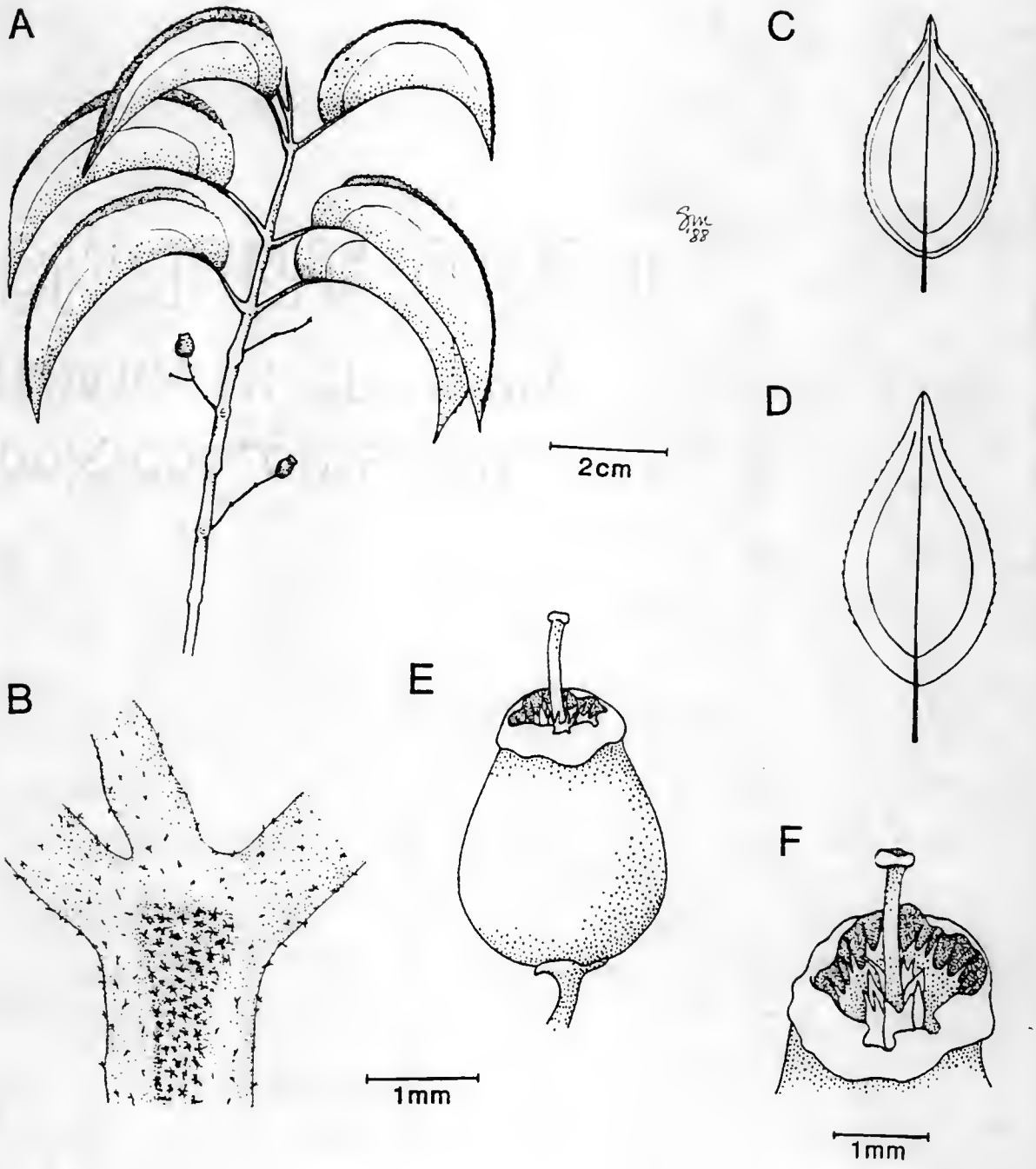
The specific epithet probably refers to the leaf apices, which are much more rounded than those of M. racemosum and probably clued Cogniaux to the distinctness of this entity from the other material labeled Wright 2518.

23. Mecranium plicatum Urban, Ark. Bot. 17 (7): 47. 1921.-- TYPE: HAITI. Dépt. du Sud: Massif de la Hotte, near Belle Endroit, on a dry grassy slope (savanna), young fr, 9 Aug 1917, Ekman H658 (holotype: B, presumed destroyed; isotypes: K!, S!).

Shrub or small tree of unknown height. Twigs moderately 4-angled, 1-2 mm in diameter, smooth, moderately pubescent with light brown, irregularly branched and matted to dendritic-stellate multicellular hairs; internodes 0.5-1

cm long. Leaf blade coriaceous, ovate, 2.9-6.3 cm long, 1.6-2.8 cm wide, often plicate if plant in full sun; apex acuminate; base rounded; margin often slightly revolute, especially near base, serrate in distal ca 3/4, the teeth ca 0.5 mm high spaced 2-3 mm apart; venation basal or suprabasal, usually with 1 pair of conspicuous secondary veins joining midvein 0.5-4 mm above lamina base, and 1 pair of inconspicuous, intramarginal secondary veins; adaxial surface with midvein and largest pair of secondary veins flat or slightly impressed, the intramarginal secondary veins and tertiary veins flat or not visible; abaxial surface with midvein and largest pair of secondary veins raised, the intramarginal secondary veins and tertiary veins flat or very slightly raised, the quaternary and higher order veins flat, the surface with scattered minute glandular hairs and some irregularly branched to dendritic-stellate multicellular hairs near base; marsupiform domatia absent on abaxial surface in axils at junction of midvein and largest secondary veins, persistent axillary hair tufts absent. Petiole 5-13 mm long, pubescent with hairs similar to those on stem. Inflorescences probably borne both in leaf axils and on leafless nodes below leaves, 1.8-2.5 cm long, 0.4-1.4 cm wide, 1 branched; peduncle 7-14 mm long. Flowers not known. Berries ca 5 x 4 mm, purple-black, glabrous or with a few minute glandular hairs, with calyx teeth ca 0.25 x 0.4 mm, and an erose-ciliate androecial fringe ca 0.3 mm high; seeds ca 0.5 x 0.3 mm. Fig. 55.

Fig. 55. Mecranium plicatum (all from Ekman H658, S). A. Habit. B. Close-up of twig. C. Leaf, abaxial surface D. Leaf, adaxial surface. E. Young fruit. F. Apex of young fruit; note androecial fringe.


A
C
D
B
E
F
2cm
1mm
1mm

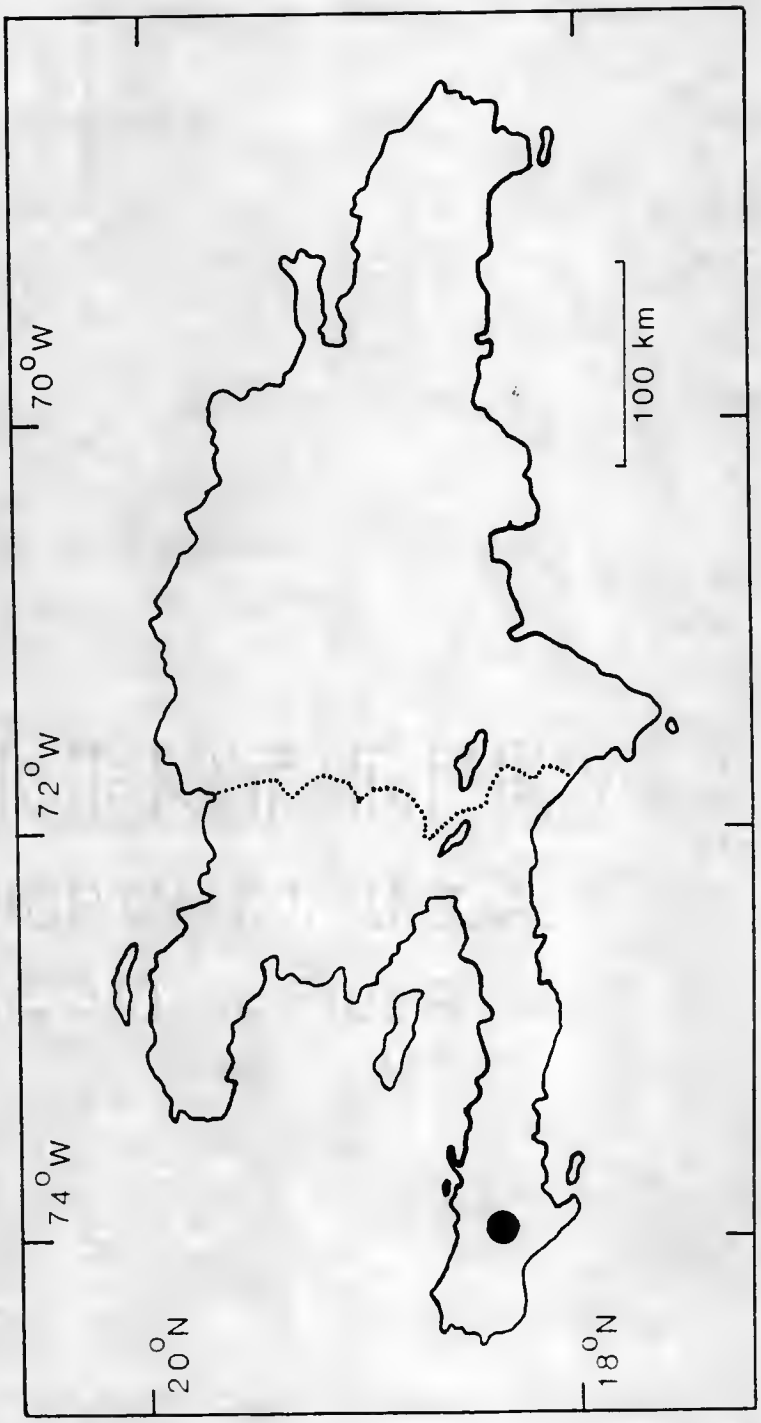
Phenology. Essentially unknown. A single collection bearing immature fruits was made in August.

Distribution and Habitat. Hispaniola (Fig. 56): endemic to the Massif de la Hotte of Haiti; elevation unknown.

Mecranium plicatum is a poorly collected species of uncertain affinity. It is known only from the type collection, which was made in the region of Morne Vanderveld (see Skean 1989). Since the flowers of M. plicatum remain unknown, no attempt has been made to include this species in the cladistic analysis or general key. (The species is included in Appendix A, the key to Hispaniolan species). The presence of true axillary inflorescences, 4-merous fruits, and an androecial fringe confirm the placement of this species in Mecranium. The gross vegetative morphology, relatively large young fruits, and phytogeography suggest that M. plicatum could be included in sect. Sagraeoides. However the type specimens lack marsupiform mite domatia and are similar in leaf shape to M. microdictyum in sect. Mecranium.

Mecranium plicatum is unique among all other species of the genus in having branched hairs that are nearly dendritic-stellate. With relatively large immature fruits and membranaceous to coriaceous, plicate leaves, plants of this species are similar to M. acuminatum and M.

Fig. 56. Distribution of Mecranium plicatum.


74°W
72°W
70°W
20°N
18°N
100 km

amygdalinum. They are also similar to M. microdictyum, except for their apparently larger flowers.

Mecranium plicatum has occasionally been confused with M. amygdalinum. The latter generally has narrower leaves (1.1-2.3 vs. 1.6-2.8 mm wide), is much less pubescent, and is not known from the Massif de la Hotte.

NOMINA NUDA

Mecranium coccineum C. Wright in Sauvalle, Anales Acad. Ci. Med. Habana 5: 435. 1869. = *Mecranium haemanthum*.

Mecranium valde Urban ex Barker and Dardeau, Fl. D'Haiti, p. 267. 1930. = *Mecranium haitiense*.

Tamonea integrifolia Cook and Collins, Contr. Nat. Herb. 8: 249. 1903. = *Mecranium latifolium*.

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APPENDIX A
KEY TO THE SPECIES OF MECRANIUM ON HISPANIOLA

1. Internal calyx lobes, free, imbricate, calyptra absent; petals obovate, ovate, or narrowly triangular, lacking a distinct apical notch; ovary ca 1/2 inferior; marsupiform domatia present on leaf abaxial surface at junction of midvein and largest 2° veins.
   2. Petals obovate or ovate, usually appearing ovate due to involute margin, 1.6-2.1 mm wide, with several major longitudinal veins, apices obtuse.
      1. M. amygdalinum.
   2. Petals narrowly triangular, 0.4-0.9 mm wide, each with a single major longitudinal vein, apices acuminate.
      2. M. acuminatum.

1. Internal calyx lobes fused in a dome-like or conical calyptra; petals obovate, rounded, each with a distinct apical notch where imbricate in bud; ovary ± inferior; marsupiform domatia absent or present.
   3. Conspicuous collarlike flanges, 1-3 mm wide, encircling nodes of twigs; petals red-purple.
      4. M. crassinervum.
   3. Conspicuous nodal flanges absent, twigs encircled by minute ridges at nodes; petals white or red-purple.

4. Leaves of fertile shoots with blades consistently less than 4 cm long; petioles 2-8 mm long.
   5. Young twigs and petioles densely pubescent with unbranched to irregularly branched and matted multicellular hairs; abaxial lamina surface pubescent with similar hairs concentrated in axillary tufts at junction of midvein and largest 2° veins and at lamina base; smallest veinlets flat or raised abaxially; lamina bases with margins flat or revolute and forming basal pseudodomatia. 10. M. alpestre.
   5. Young twigs and petioles essentially glabrous or with hairs lining internodal grooves; abaxial lamina surface essentially glabrous; smallest veinlets raised abaxially; lamina bases with margins nearly always revolute, forming basal pseudodomatia. 9. M. tricostatum.
4. Leaves of fertile shoots with some to all blades greater than 4 cm long; petioles 3-21 mm long.
   6. Twigs strongly 4-angled and longitudinally ridged roughened with bases of caducous multicellular hairs; largest leaves of fertile shoots usually greater than 4 cm wide; inflorescences borne ± exclusively on leafless nodes below the leaves and on old wood; flowers red-purple. 21. M. tuberculatum.

6. Twigs slightly to moderately 4-angled, lacking longitudinal ridges, smooth, not roughened; largest leaves of fertile shoots usually less than 4 cm wide; inflorescences borne in leaf axils and on leafless nodes just below the leaves; flowers white, or (in M. haitiense) pink.

7. Young twigs slightly to densely pubescent with unbranched to irregularly branched and matted multicellular hairs scattered on the twigs, sometimes concentrated in internodal grooves, but not limited to these grooves.

8. Leaves with 5 major longitudinal veins visible on adaxial surface, the midvein, 2° veins and 3° veins impressed in living material, flattening upon drying, but still visible as slight impressions; leaves ± plane or slightly curved abaxially; twigs densely pubescent with brown hairs; anthers narrowly obovate, opening by 2 pore-like slits, the septum between the anther sacs intact; anther sacs 0.3-0.5 mm long.

19. M. puberulum.

8. Leaves with 3 major longitudinal veins visible on adaxial surface, the midvein, 2° veins, and 3° veins flat, not

impressed; twigs slightly pubescent with golden-brown hairs that are irregularly branched to nearly dendritic-stellate; leaves strongly plicate.

23. M. plicatum.

7. Young twigs essentially glabrous or with hairs limited to 2 internodal grooves, not scattered on twigs.

9. Petals pink; anthers narrowly ovate, opening by a single small apical pore; twigs essentially glabrous.

5. M. haitiense.

9. Petals white; anthers narrowly obovate, opening by 2 pore-like slits, the septum between the anther sacs intact, or opening by a single gaping foramen, the septum between the anther sacs torn; twigs glabrous or with hairs lining internodal grooves.

10. Marsupiform domatia present on abaxial surface of lamina in axils at junction of midvein and largest 2° veins; anthers opening by 2 pore-like slits, the septum intact.

11. Lamina coriaceous, narrowly ovate or elliptic, non-plicate, base cuneate or slightly decurrent; non-

membranous portion of calyx bearing 4 additional narrowly triangular internal projections, these 0.2-0.7 mm long and opposite external calyx lobes; petals 2.1-2.5 mm long; anther sacs 0.3-0.6 mm long; domatia not expanded.

17. M. birimosum.

11. Lamina membranaceous or coriaceous, ovate, occasionally slightly plicate, base slightly cordate or rounded; non-membranous portion of calyx lacking narrowly triangular internal projections; petals ca 1.6 mm long; anther sacs ca 1.2 mm long; domatia sometimes expanded into rounded, gall-like structures.

18. M. microdictyum.

10. Marsupiform domatia absent on abaxial surface of lamina in axils of junction of midvein and largest 2° veins, these areas glabrous or sparsely to densely pubescent with tufts of unbranched to irregularly branched and matted multicellular hairs; anthers opening by a single gaping foramen, the septum between the anther sacs torn.

12. Abaxial surface of lamina with persistent axillary tufts of hairs located at the 2 major vein junctions; twigs glabrous or with hairs lining internodal grooves.

13. M. integrifolium.

12. Abaxial surface of lamina essentially glabrous, hairs at major vein junctions mostly caducous; twigs glabrous.

13. Adaxial leaf surface with midvein, 2° veins and 3° veins strongly impressed in living material, flattening upon drying, but still visible as slight impressions.

14. Lamina elliptic or obovate, 2-5 (6) cm long, often slightly to strongly inrolled abaxially, apex usually obtuse or rounded; smallest veinlets usually flat abaxially in dried material.

12. M. revolutum.

14. Lamina ovate or elliptic, rarely obovate, (3.1) 4.1-9.9 (13.1) cm long, not inrolled

abaxially, apex usually acuminate; smaller veinlets slightly raised in dried material.

7. M. ovatum.

13. Adaxial leaf surface with midvein, 2° veins and 3° veins ± flattened, not impressed.

15. Anther sacs 0.8-1.2 mm long.

11. M. multiflorum.

15. Anther sacs 0.3-0.7 mm long.

15. M. septentrionale.

APPENDIX B
KEY TO THE SPECIES OF MECRANIUM ON CUBA

1. Twigs strongly 4-angled and longitudinally ridged; largest leaves of fertile shoots greater than 4 cm wide; inflorescences borne ± exclusively on leafless nodes below the leaves and on old wood; petals red-purple.
   2. Leaf apex acuminate or acute; lamina 2-3.5x as long as wide, the adaxial surface with midvein, 2° veins and 3° veins ± flat, not impressed. 20. M. haemanthum.
   2. Leaf apex short-acuminate, obtuse, or rounded; lamina 1-2x as long as wide, the adaxial surface with midvein, 2° veins and 3° veins strongly impressed in living material, flattening upon drying, but still visible as slight impressions. 21. M. tuberculatum.
1. Twigs slightly to moderately 4-angled, lacking longitudinal ridges; largest leaves of fertile shoots less than 4 cm wide; inflorescences borne in leaf axils and on leafless nodes just below the leaves; petals white.
   3. Twigs slightly to moderately pubescent with unbranched to irregularly branched and matted multicellular hairs scattered on the twigs, sometimes concentrated in

internodal grooves, but not limited to these grooves; anthers narrowly ovate, opening by a single small apical pore, the anther sacs ca 1.2 mm long.

3. M. racemosum.

3. Twigs glabrous or pubescent with hairs limited to internodal grooves; anthers narrowly obovate, opening by a gaping, 2-chambered foramen.

4. Twigs glabrous; leaf apex obtuse; smallest veinlets on leaf abaxial surface flat in dried material; W. Cuba.

22. M. obtusifolium.

4. Twigs glabrous or with hairs lining internodal grooves; leaf apex acuminate, less commonly acute; smallest veinlets on leaf abaxial surface flat or slightly raised in dried material; E. and central Cuba.

13. M. integrifolium.

APPENDIX C
KEY TO THE SPECIES OF MECRANIUM ON JAMAICA

1. Inflorescences borne ± exclusively on leafless nodes below leaves and on old wood; hypanthium 2.8-4.4 mm long, narrowly prolonged at base, the flowers appearing pedicellate; petals 2.9-5.2 mm long; distal stamen segments (anthers) 2.2-3.4 mm long, the anther sacs 1.1-1.8 mm long.

   8. M. virgatum.

1. Inflorescences borne in leaf axils and on leafless nodes just below the leaves; hypanthium rounded at base, the flowers appearing sessile.

   2. Hypanthium 2.7-3.7 mm long; petals 3.4-4.2 mm long, white or tinged basally with pink; distal stamen segments (anthers) 1.8-3.2 mm long, the anther sacs 1.3-2.2 mm long; twigs glabrous.

      6. M. purpurascens.

   2. Hypanthium 1.4-2.4 mm long; petals 1.5-2 mm long, white; distal stamen segments (anthers) 1.1-1.6 mm long, the anther sacs 0.6-0.7 mm long; twigs glabrous or pubescent with hairs lining internodal grooves.

      14. M. axillare.

BIOGRAPHICAL SKETCH

James Dan Skean, Jr., was born on 14 June 1958 in Knoxville, Tennessee, the first of four sons born to James Dan Skean (1932-) and Nellie Ann Sherrill Skean (1930-1981). Dan was reared in Knoxville and Bowling Green, Kentucky, where he was graduated from Bowling Green High School in 1976. Dan went on to attend Western Kentucky University in that same city, receiving the degree of Bachelor of Science in biology in 1980. For two years Dan studied under James W. Hardin at North Carolina State University in Raleigh, receiving the degree of Master of Science in botany in 1982. Studies leading to the degree of Doctor of Philosophy in botany were carried out under the direction of Walter S. Judd at the University of Florida in Gainesville from 1982 to 1988. Dan was married to Viveca Lee Slantis on 25 June 1988. Since August of 1988 Dan has been an Instructor in the Department of Biology at Albion College, Albion, Michigan.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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Associate Professor of Botany

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Dana G. Griffin, III
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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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This dissertation was submitted to the Graduate Faculty of the Department of Botany in the College of Liberal Arts and Sciences and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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